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Season's Best

We'd like to think that ours is more than "just another greeting" for the holiday season. Our good wishes for a joyous Christmas include a sincere expression of appreciation to our customers for the pleasant relationships we enjoy throughout the year. In this annual season of friendly good-fellowship, it is well to acknowledge the warm feelings that stem from our long-standing friendships with so many, many wonderful people connected with our chosen field. To each and every one of you . . . the SEASON'S BEST.

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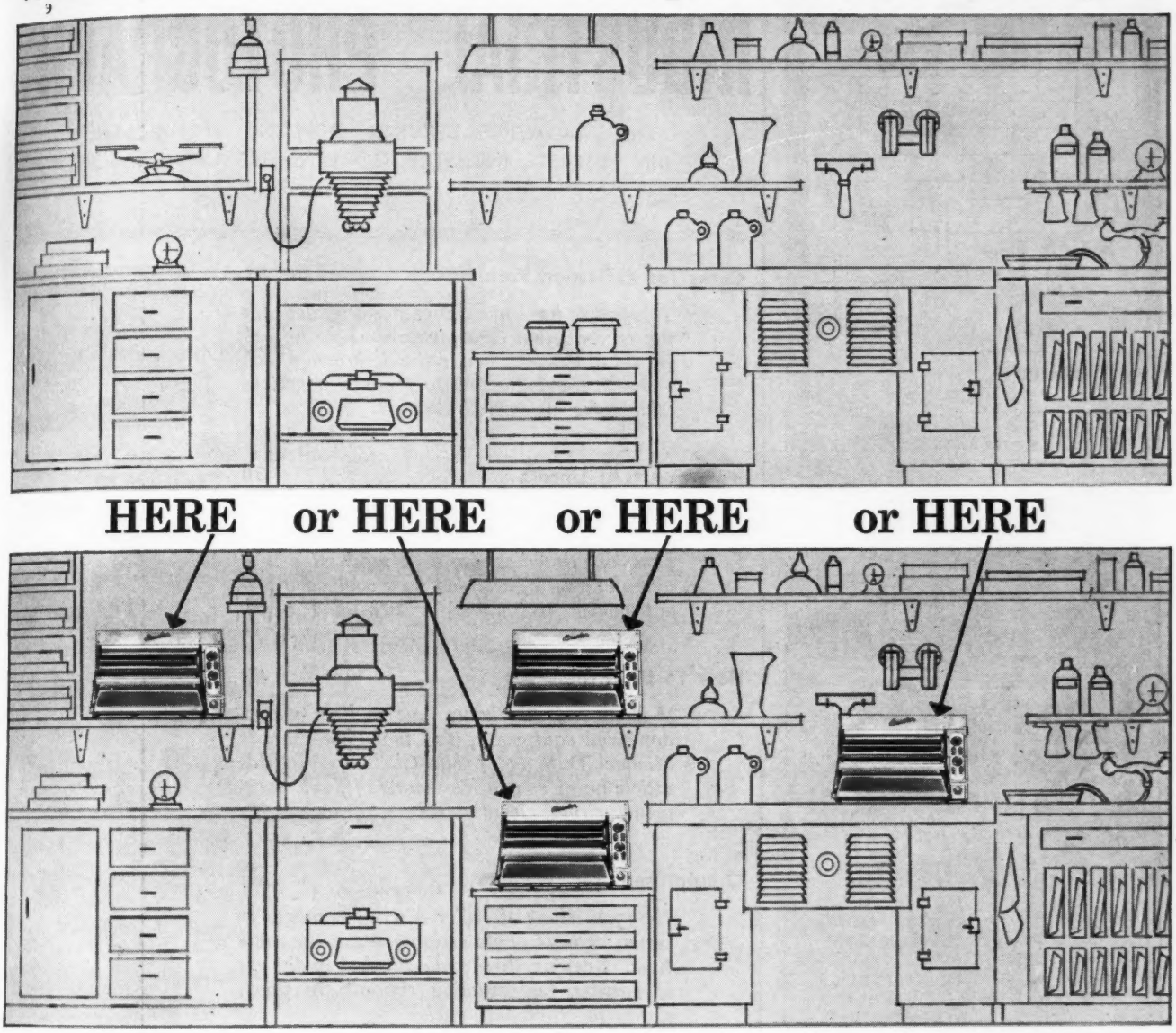

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INDUSTRIAL PHOTOGRAPHY

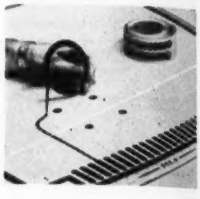
THE MAGAZINE SERVING IN-PLANT TECHNICIANS IN BUSINESS, INDUSTRY, GOVERNMENT AND SCIENCE

Cures for Reflection Problems 31

This article has some rather startling ideas for the reproduction cameraman on how he can get rid of this bugaboo in the darkroom which makes it tough for him to produce negatives with sufficient overall contrast.

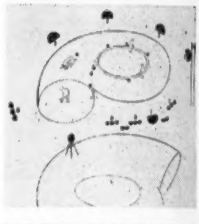
It's An Art At Lincoln 38

Like highly-skilled artisans, Lincoln Lab's specialists have refined the photographic aspects of printed wiring card production to a new degree. Here's how they evolved a layout master technique for two-sided cards.



How To Light Monsters 42

If anyone should know how to light mastodon-sized equipment, it's Chief Photographer Michael Durante of Allis-Chalmers. In this article he gives you his secrets of flash placement, wiring, elevation, exposure, etc.

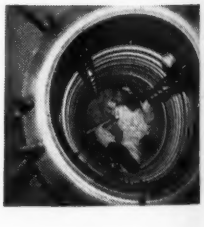


Omnipresent Mr. Wichers 44

Henry Wichers of Hiller Aircraft manages to cover multiple photo assignments at the same time. Keeping these balls juggled in the air is possible by assigning subordinate photo duties to other personnel.

Challenge to Their Ingenuity 48

Ever tried taking pictures with boxing gloves? This is what atomic photographers at GE's vast nucleonics reservation are up against every day, where radiation safety practices influence their working routines.



ABOUT THE COVER: The stunning quartet of photos decorating our front cover were provided by the Copper & Brass Research Association and show the varied lighting used by one photographer to illustrate the steps in fabricating bronze window frames. These particular frames ended up in the new San Francisco branch of the John Hancock Mutual Life Insurance Co. For more about industrial lighting set-ups, turn to page 42.

DEPARTMENTS

Editor's Mail 8
New Products 10
IP Calendar 22
Shoptalk 23
Free Literature 76
Briefs 84
Related Reading 86
Patent News 87
Microrecording 88
Electronic Flash 90
Shortcuts 94

CONTENTS

DECEMBER 1961

What You Need To Know About Paper 27
Everything, but everything, about reproduction papers!

SRE Show Preview 37
Here's what to expect at the biggest reproduction show yet.

Around the Corner From The President 40
IBM has a busy repro department to serve its big brass.

Film Instead Of Notebooks 46
This is the teaching aid at Kodak's industrial workshops.

When To Contract Outside Services 52
Only by knowing your production unit cost can you know.

SPOTTING THE COLUMNS

Walter Strenge's Industrial Movie Clinic 12
The former ASC president answers your questions.

Industrial Roundtable 15
Do you know the 3 basic types of photographers?

A-V Workshop 16
Visuals help football players improve their game.

Photo-instrumentation 19
NOL has perfected special lighting for shock tests.

European Newsletter 20
Comments on Britain's new in-plant film awards.

Model Ships, Model Oceans 56
Photos play a major role in charting ships' behavior at sea.

Diazo Helps Keep Them In Touch 58
Reproduction at Lennox Industries communicates.

Seattle Scans Its Sewers 62
Cameras are the silent sentry patrolling this city's sewers.

What Happens In The Storeroom? 66
Time lapse studies streamlined operations at one GE plant.

ALSO: AN UNUSUAL INDUSTRIAL AD PROBLEM . . . Page 60. EDGERTON'S CHAIN EXPEDITION . . . Page 68, IAVA . . . Page 81.

INDUSTRIAL PHOTOGRAPHY is published monthly by Photography in Business, Inc., 10 East 40th St., New York 16, N.Y. SUBSCRIPTIONS: U. S. — $6 for one year, $10 for two years, $13 for three years; Canada — $8 for one year, $13 for two years, $17 for three years; other foreign countries — $10 for one year, $16 for two years, $20 for three years.

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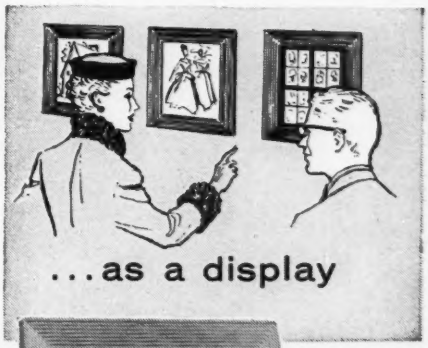

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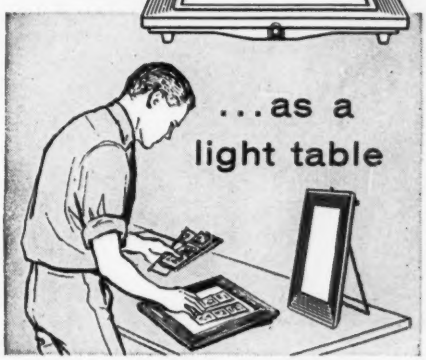

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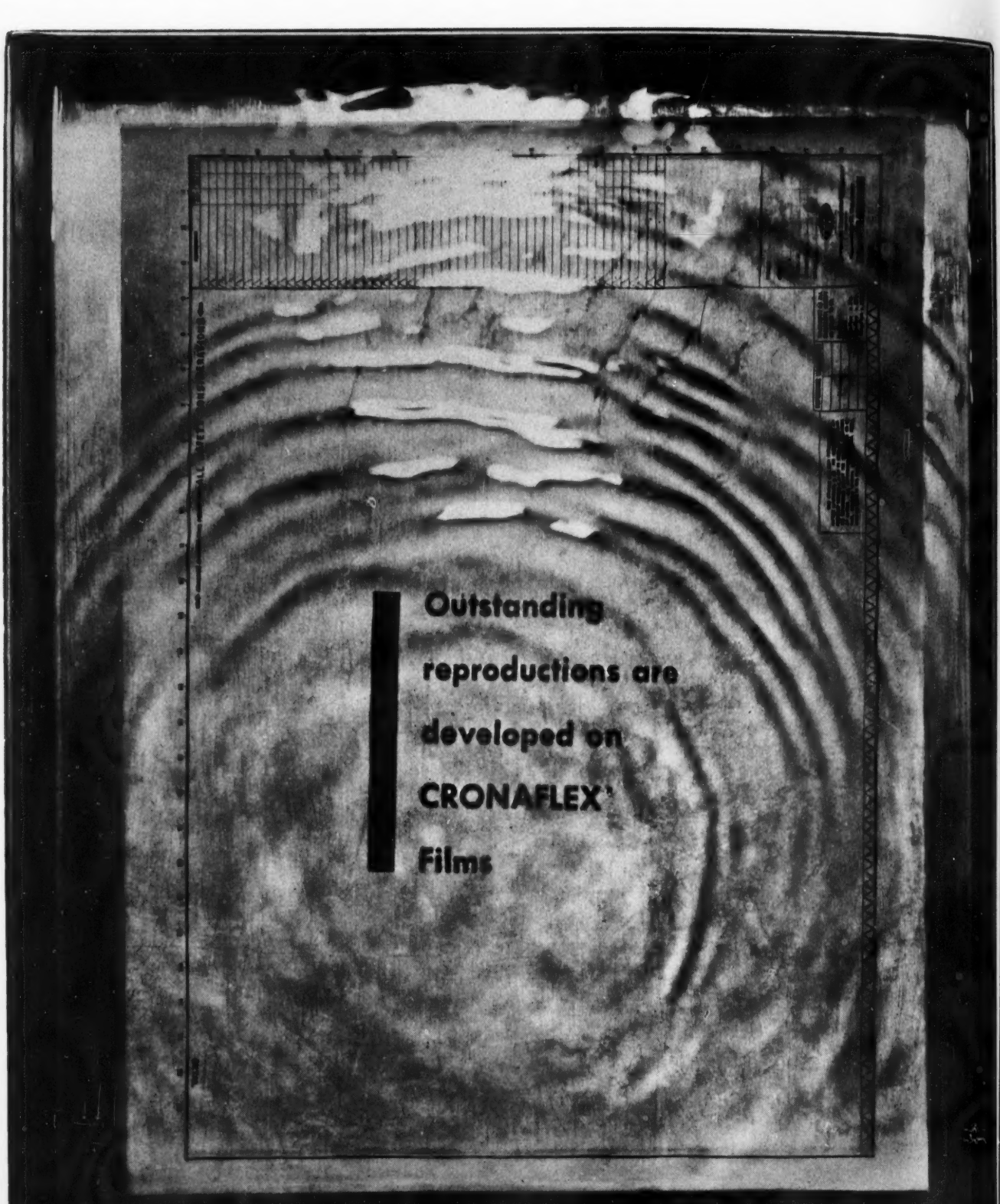
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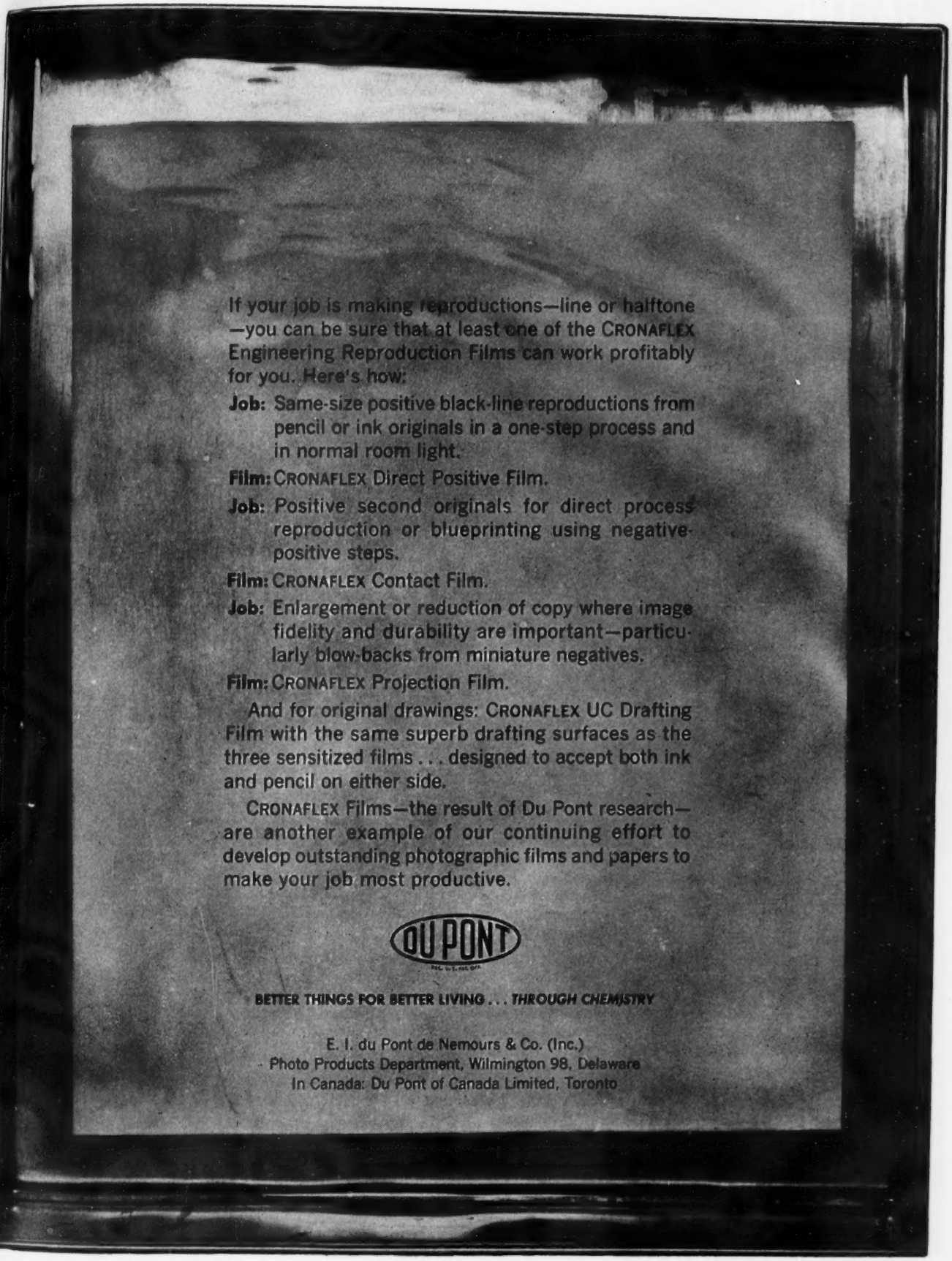
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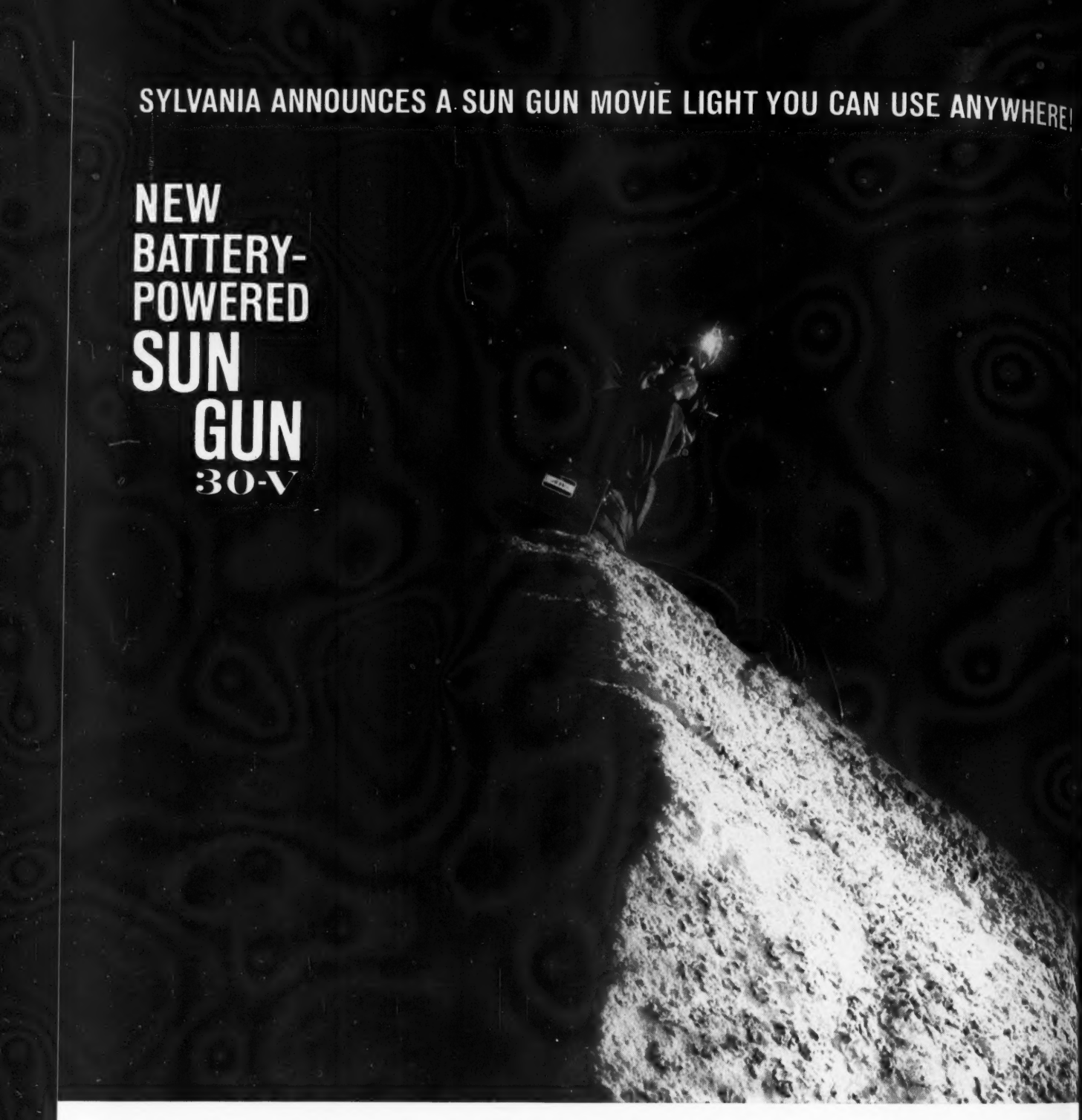

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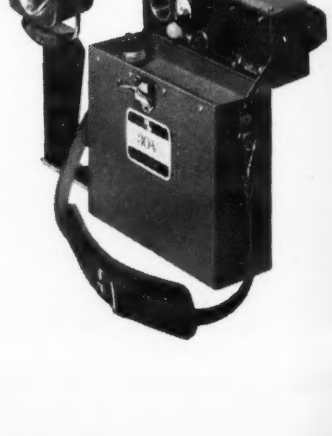

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British Admiralty chart of New York harbor (1775) reproduced on Kodagraph Contact Film, Estar Base. Courtesy of New-York Historical Society.

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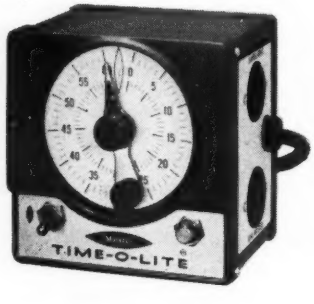

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editor's mail

mitchell badler, editor

Old Refrain

I enjoyed serving as a panelist in your last Color Seminar. However, your readers who submitted questions to us are apparently overlooking the new literature which is constantly being released on the technique of using color materials. This material could often answer their questions. The worker in the color field should put himself in touch with all sources of information and keep an extensive library, bringing himself up-to-date with each change in technique.

One other fault I've noticed is that the color worker tries to do something with the material which it was not intended to do. Frequently mishaps cause materials to be used unintentionally in a manner for which they were not designed and results sometimes are adequate. This is a lucky break the photographer gets, but I dislike hearing a photographer brag that he used type B film outdoors without a filter or neglected to use the gray card with the color materials deliberately. Generally, his color processor is the one to be congratulated. — Jim Hampson, Room 825, Slattery Building, Shreveport, La.

We welcome Jim Hampson's comments because (1) basically we agree with what he has to say and (2) it gives us an opportunity to remind readers that our Third Annual Color Seminar will appear in the January and February 1962 issues of IP.

Kudos

The September issue was excellent — especially the A-V section. Keep up the good work. — Robert L. Beard, Ford Motor Company, Photographic Scientific Lab, Dearborn, Mich.

SAC Reprints IP

We publish a Reconnaissance Technical Bulletin containing articles of technical interest on photography. The article titled "Blueprinting Your Department" (July, 1960) in your magazine would make good material for the Bulletin and provide a convenient way of disseminating valuable information among our reconnaissance technical units. May we have permission to reprint it? — Lt. Col. Donald K. McCash, Headquarters Strategic Air Command, USAF, Offutt Air Force Base, Nebraska.

IP Helps AF Photo Chief

For six or seven years I have been receiving INDUSTRIAL PHOTOGRAPHY and have enjoyed each and every issue . . . I have found the magazine to be a most wonderful reference source and have kept every copy. Some are getting to be a little tattered and torn but they are still useful. Can I get replacements?

In my new duty assignment as Chief, Photographic Division, Directorate of Development Planning, Air Photographic and Charting Service, Military Air Transport Command, I deal daily with cinematography, aerial and still photography . . . Our library has been receiving your publication for approximately one and one-half years and it gets a thorough reading as it goes through the building. INDUSTRIAL PHOTOGRAPHY has assisted me in performing my work more efficiently in the past and I am looking forward to its continued assistance to me in my new duty assignment. — Ben W. Fagen, Major USAF, Orlando AFB, Florida.

We are happy to learn of our usefulness to you; replacement copies are on their way.

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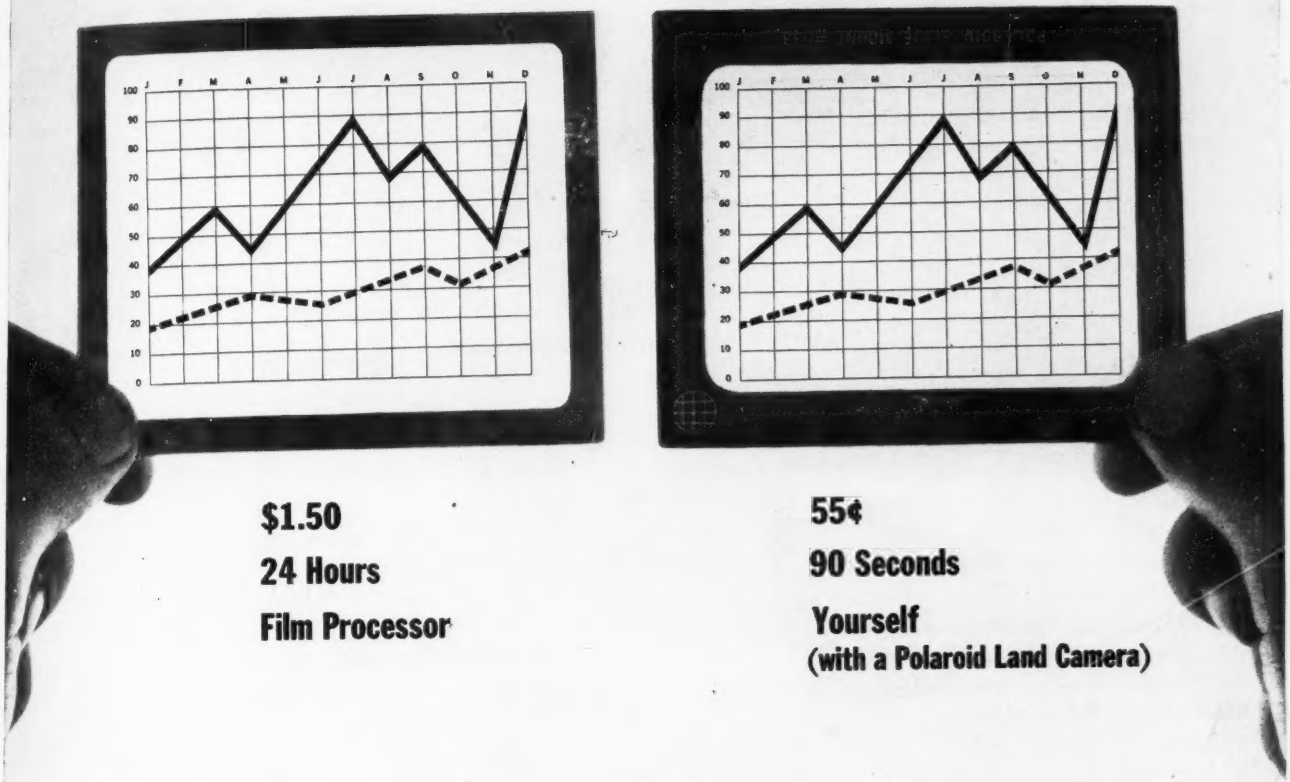

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To make your own black-and-white slides – quickly and economically – here's all you have to do: snap a picture with a Polaroid Land Camera loaded with special transparency film. Then pull a tab, wait a moment and open the rear of the camera.

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A new type of transparency film, PolaLine film, is now available. It's been designed especially for line-copy slides and it produces crisp, black lines and clear, transparent backgrounds. These are 3¼ x 4 transparencies for standard lantern slide projectors.

There are also continuous tone films for both standard lantern slide projectors and for use in a complete Polaroid Land system that employs 2¼ x 2¼ slides in a Polaroid projector. (Development time for continuous-tone slides is two minutes.) All three projection film types can be used in any Polaroid Land Camera that uses 40-series films (except the J-66).

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new products

reviewed by bert lefkowitz

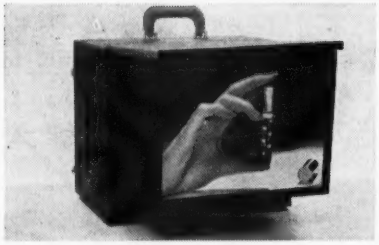
We have noted in the past the interest being sparked in 8mm films for sales and training purposes. A number of manufacturers, among them Fairchild, MPO, Tandberg, and Fujica have introduced equipment designed to take advantage of 8mm economy. Most recently, Vicom, a division of Elgeet Optical Co., unveiled its portable projector, the Mark II which may be used by salesmen on calls or as a point of purchase display. Picture brightness on the built-in screen is exceptionally good as well as the sound reproduction from the transistorized amplifier.

Another firm that will shortly be entering the 8mm field is Technicolor with a very compact cartridge-loaded projector. Its design was predicated on the ease of program change, no threading being required. Cartridges run 4½ minutes, usually adequate to describe a product, and can be changed with your eyes closed. Further technical details will be available at a later date.

We were also impressed this month with the new Leitz Orthomat microphotographic camera which will fit any microscope. This unit is so automatic that the only operations required of the technician are button pushing and foot pedal motions. While not designed for the casual photomicrographer, the device almost eliminates the need for any specialized photographic knowledge. It takes a 36-exposure magazine.

Diazo Developer 101

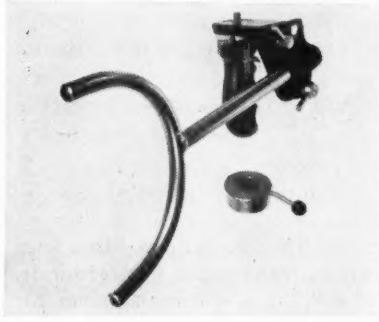
Ozalid Division of General Aniline & Film Corporation is now offering a new system for pressurized ammonia gas development in dry diazo printing. Advantages of the system include considerably lower initial cost and reduced maintenance and replacement expenses. The anhydrous ammonia system consists of a control box mounted on the front of the printing machine which contains the off-on switch and flow regulator. Tubing connects this panel with an ammonia cylinder which may be located at distances up to 100 feet from the printing room. Outstanding advantage of the system is claimed to be the elimination of daily developer mixing and danger of fumes from spilled or broken bottles of liquid ammonia.



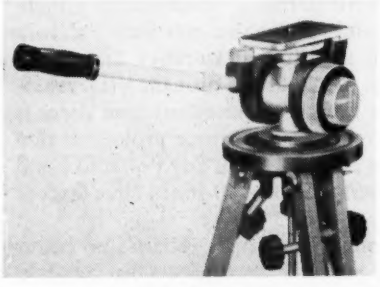
103 Rear Projection 8mm

106 Still Zoom Lens (p. 74)

107 A-V Training Aid (p. 74)



108 Camera Support (p. 74)



109 Tripod Pan Head (p. 74)

Powerful Flood 102

Natural Lighting Corporation has just introduced a new flood light, the Color-Tran Super-Eighty, called the big brother of the Super Kicker Light. When powered by a ColorTran Converter it will illuminate a 7-foot circular area with 940 foot-candles at 10-foot lamp-to-subject distance, a performance said to be formerly possible only with 10,000 watt spots. Another advantage of the Super Eighty is its 9½ lbs. weight which enables the user to use it on conventional stands as well as with Gaffer-Grips. Acessories include a special carrying case with formed foam rubber interior to hold two lights, scrims, barn doors, and gel rings. Price: $56, less lamp.

8mm Projector 103

A lightweight Model 8mm Sound Projector with built-in 9" x 12" rear projection screen has been announced by the Vicom Audio-Visual Communications Division of the *Elgeet Optical Company*. The new projector weighs less than 18 lbs. and is completely portable and self-contained. Features of the Mark II include a solid state transistor amplifier, provision for external speakers and earphones and 24 and 16 frame-per-second operation. Long trouble-free use is insured by the permanently lubricated motors and parts. Films up to 15 minutes in length may be repeated endlessly in the self-rewind mechanism incorporated within the projector. Vicom also has available the Model Mark II-A which features a magazine capacity up to 30 minutes per show. The new machine should find major applications in the sales field and in training and education. Price: $425.

Reproduction Film 104

Eastman Kodak Company has announced an extremely durable autopositive film on their new Estar Base. The Kodagraph film may be handled and processed under ordinary room light and has wide exposure latitude. Exposure is made by contact printing

continued on page 74

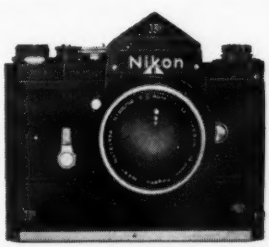
the one picture...

or the whole sequence

Automatic fire power is superior fire power. The man with a motor-equipped Nikon commands an advantage no manual, single-shot equipment can ever equal—no matter what the assignment.

The dramatic effectiveness of the motor-equipped Nikon is in no way limited to action sequences for the sake of action alone. For, apart from pure still-life, there isn't a picture that doesn't involve some motion or movement—some change of situation, attitude or pose. And the ability to capture even the subtlest change, the slightest movement—a momentary occurrence or fleeting expression—can make the difference between a commonplace shot and a great picture.

The motor drive for the Nikon F is an incredible tool. It can be readily attached to the conventional Nikon F and readily detached. Battery powered, it can be operated in-hand or remotely, or it can be fired by radio control. It advances the film, winds the shutter, and makes the exposure—automatically. And it can be set to shoot singles or bursts, or to fire continuously through an entire load of film—at any rate, up to 4 exposures per second.



If you want to experience a new sense of picture power, get a motor-equipped Nikon F into your hands. Get the feel of what it means to be free of camera mechanics and camera manipulation—free to create pictures as *you* see them, rather than as the camera sees them.

Inquire at your regular Franchised Nikon Dealer. For complete details, write to Dept. IP-12.

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walter strenge, asc

Got A Problem? Ask A Hollywood Expert

Q. Will you please recommend a formula for preservation of both acetate and nitrate motion picture films?

A. There is no coating or other chemical treatment which will act as an effective preservative for either acetate or nitrate film supports. A high degree of image permanence can be obtained by removal of residual hypo. This is discussed in detail in American Standard PH4.8-1953, *Method of Determining Thiosulfate Content of Photographic Films.* Control of storage conditions is the best route to longest preservation of any film already on hand. American Standard PH5.4-1957, "Practice for Storage of Microfilms," describes both commercial and archival practices for such films. This standard is not written to cover cine products in general but it does supply much helpful data on conditions considered adequate for long time storage. Eastman has an excellent booklet titled *Storage and Preservation of Motion Picture Film* that describes practical methods for long time storage both before and after exposure and development.

Q. I shoot single-system optical sound newsreels for television. The original negative, both picture and sound track, is reversed in transmission so that it is changed to a positive on the television receiver. Shooting under available light requires the use of fast emulsions such as Eastman Tri- or DuPont 928. What effect does the grain pattern of these fast films have on sound reproduction? And what would happen to the sound track if it is necessary to overdevelop the negative to get a suitably dense picture negative

A. Since the sound track must be considered a "direct positive" under the transmitting conditions you describe, it should be exposed very low with a resulting unbiased density of approximately 0.4, to avoid serious sound distortion. The noise reduction operation must be reversed, that is, greatest exposure while there is low sound level. The grain pattern from negative type stock is very detrimental to sound, resulting in a pronounced "hiss" during low level sound passages. Over-developing the single system sound recording raises the gamma (contrast) on picture and sound together. However, in the case of "Direct Positive" recording, the higher gamma is beneficial rather than detrimental. This is true for both variable area and variable density types of recordings.

Need movie-making advice? Your film questions are invited by IP*'s newest columnist, Walter Strenge, famed Hollywood cinematographer. All questions will be answered and those of wide interest reprinted in* IP*. Address your questions to: Walter Strenge, A.S.C., P.O. Box 985, Hollywood 28, California.*

Q. For a film about the ocean I wish to make titles on the sand which are washed away and created by moving waves. How can I achieve this effect?

A. There are several ways this effect can be accomplished:

1. It can be done optically, by a professional film effects lab em-

continued on page 91

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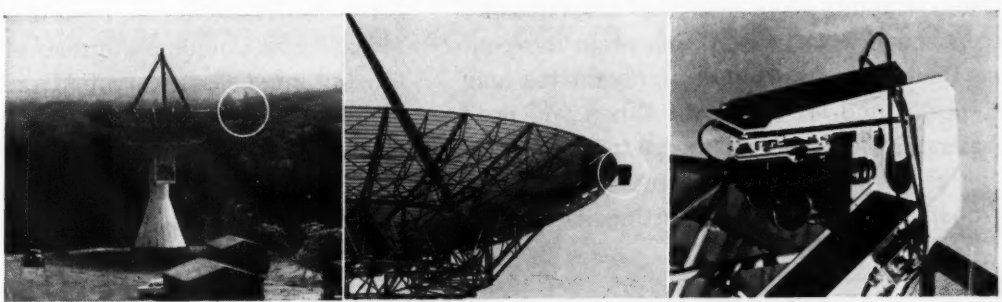

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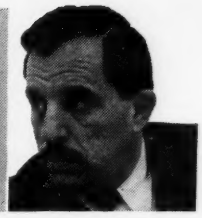


When An Outside Man Gets The Job

There are too many in-plant photographers who become bitter when their management, or its advertising agency, sends in an outside photographer to do special jobs in the plant. The complaint often heard is that they, the in-plant photographers, get all the tough and routine assignments, but when a real good opportunity arises, an outside man is called in. Another gripe is that management helps outside photographers, while the in-plant guy is told to get his pictures fast and get out of the way so that he doesn't hold up production.

Well, let's keep our wool shirts on, boys. There's a darned good reason why such things happen.

There are basically three types of photographers:

1. Those who have learned their job as a trade and consider it as such. You will find these people working in plants, on newspapers and in commercial and portrait studios.

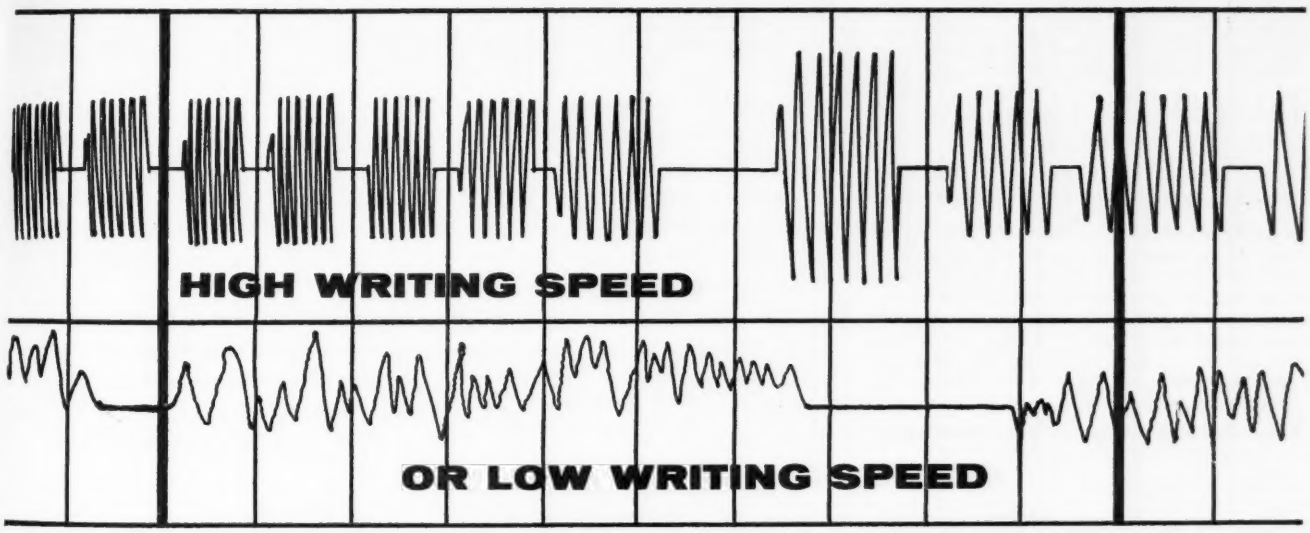
2. Those who consider themselves professionals in the sense that a lawyer is a professional. Many of them also work on newspapers and magazines, are illustrators and/or advertising photographers. Some work as in-plant photographers who do work different from the nuts-and-bolts type of operation. Walter Farynk, who used to do the Cadillac ads when he was with General Motors, is such a type. Another is Arthur Lavine, who heads up the photo staff at the Chase Manhattan Bank in New York. There are many others, but these two names will suffice at present.

3. And then there is the artist or poet. He is the kind of photographer who cannot work on definite assignments but has to work in the area where he expresses himself on specific things, places or people. Among these are Gene Smith, Ernst Haas and the French photographer, Cartier-Bresson.

Each one of us is as different as are our fingerprints. We all have different backgrounds, different training and are each of us of a different personality and temperament.

Using myself as an example,

continued on page 72



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a-v workshop

***james hughes,
executive editor***

Block That Photograph!

In America sports are big business. And in sports as in any other business, success pays off. It's the winning teams that make the money.

And just as audio-visual aids are helping food merchants sell more groceries and hence improve their profit picture, they are helping teams score more points and thus improve theirs.

The modern coach spends almost as much time in the movie projection room as he does on the practice field. Movies of drills and games are used by these coaches to detect weaknesses in friend and foe alike. They then try to correct the former and exploit the latter. Almost every sport employs analysis films — baseball, basketball, track and field . . . even golf pros record their pupils' swings for dissection.

"Racing" Photography

Racing — both boat and horse — employs "aid photography" in some distinctive ways. In sail and powerboat racing, Polaroid Land pictures are taken of starts to settle questions of whether a boat crossed the line before the gun. In horse racing millions of dollars in purses and bets hinge on "photo finishes" and riding fouls detected by film patrols.

But it is in football that athletic audio-visual aids are most relied upon. A new defensive cry is "Block that photograph!"

"Game movies" are the most widely used technique. With the game movie the coach can stop time with his projector; he can watch an unsuccessful play a hundred times if need be in his search for errors. The movie cannot be challenged by the players who missed the key blocks.

Games may be won or lost in the projection rooms and, with films as belated evidence, there have been attempts to reverse game results. And, naturally, the embalming of heated action on film has brought extra condemnation of erring officials, players and coaches.

Motion pictures are not the only audio-visuals employed as tactical aids in trying to score touchdowns. Reports of the uses of slide projectors include that from the University of South Carolina, where players leaving the field during the play can go to a sideline screen and see Polaroid Land slides of the opposition setups that were shot only shortly before.

The Polaroid Land camera is also employed by pro football's New York Giants. Intermittently, during the rough and tumble of games, a sock sails out of the stands and lands near the Giant bench. The flying hosiery contains Polaroid Land prints of action on the field for study by Coach Allie Sherman.

Television has also found favor with coaches. The University of Southern California employs closed-circuit TV to bring a press-box view of the action down to monitors on the bench. If an assistant coach in the press box has a play he wants to suggest, he merely sketches it for the boys "on camera."

Quick Diagnosis

For pressbox-to-bench communications, pro football's Los Angeles Rams have installed a Tel-Autograph, the device hotels use to relay written orders from one floor to another. With this bit of equipment, a coach high up above the action can sketch a play and have it reproduced instantly in front of the Ram's bench.

Motion pictures, however, remain the prime visual aid in football, and coverage of games has

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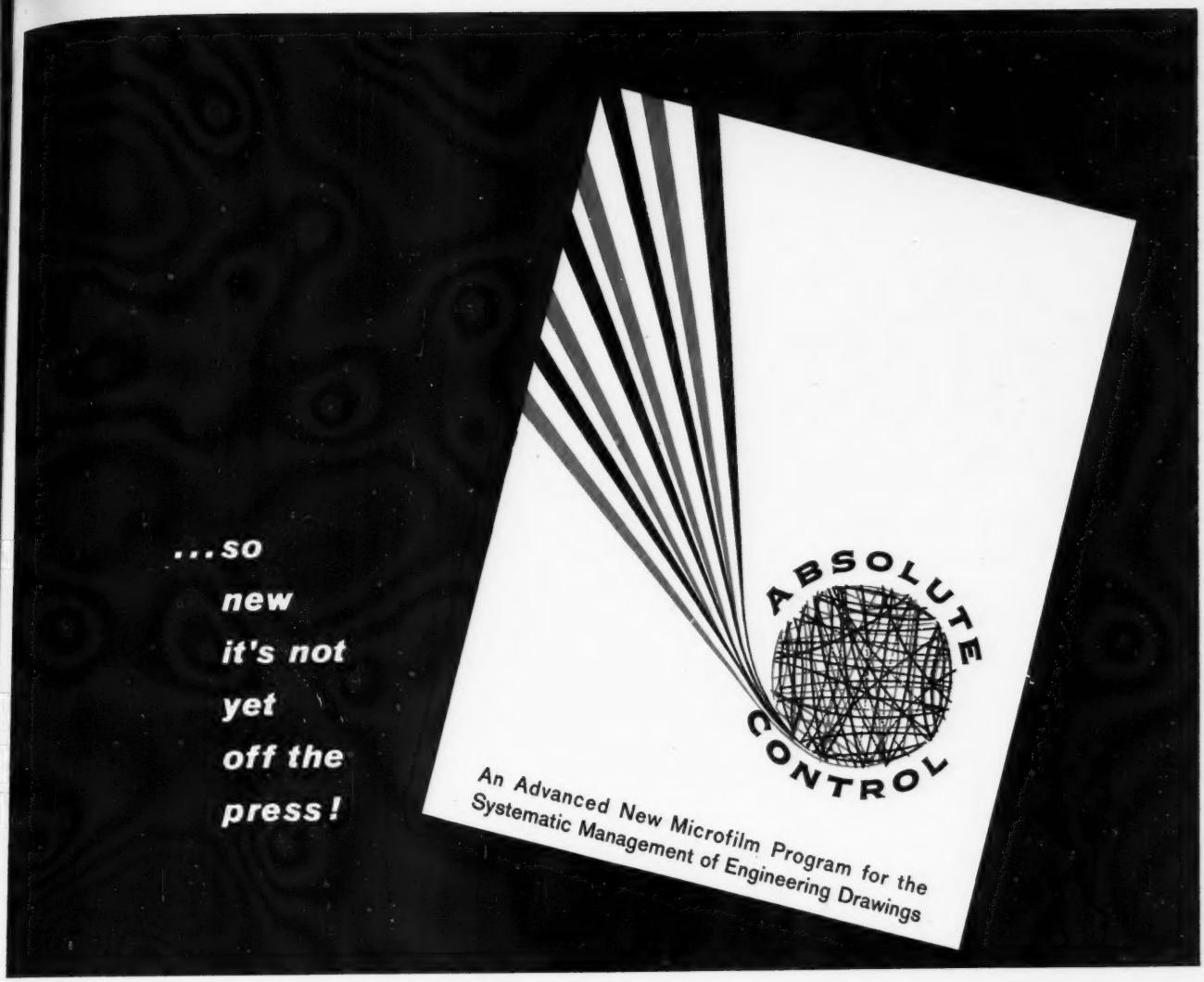

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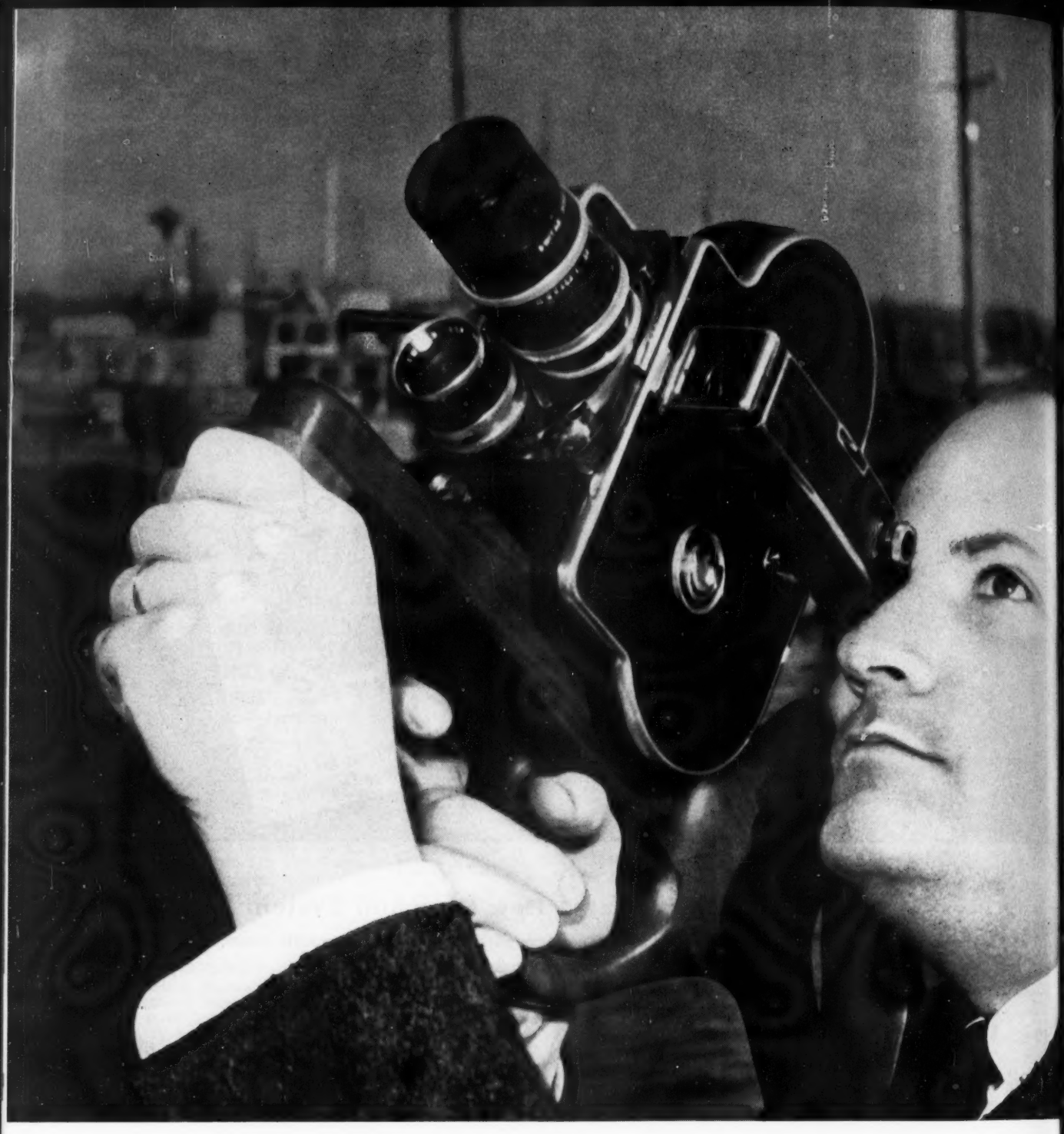

HE CHOSE BOLEX A MILLION MILES AGO

(and enjoyed handling ease, versatility and precision every step of the way)

When photographer George Perkins II accepted a south-of-the-border travelogue filming assignment 11 years ago, he marked down two camera requirements: High quality, light weight. He then selected the 16mm Bolex.

The result of that trip was a feature length color film of Mexico, the Yucatán Peninsula and Guatemala of such quality that it is still in demand in lecture halls.

Now at the million-mile mark in his camera travels, Perkins, an associate of the Burton Holmes Travelogues Company of Hollywood, has looked through the lens of his Bolex at memorable scenes in 22 countries around the world. "The feeling of real pleasure I had when I first took my 16mm Bolex from its case that day in Mexico has only been multiplied in the years since," Perkins says.

"The way it handles, the ease with which it can be hand-held, the versatility of its three-lens turret . . . Superb through-the-lens viewing and focusing and the new variable shutter and viewer that match so perfectly with so many lenses . . . All these qualities make Bolex an exceptional camera for my work in travel photography and in the industrial-commercial field." That's how a professional enthuses about *his* Bolex.

The pleasure Bolex has brought Mr. Perkins has been shared by travel film audiences in more than 200 cities in the United States and Canada. You can get in on the Bolex fun for a surprisingly low investment.

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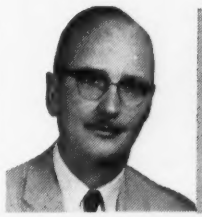

photo-instrumentation

paul lathrop, general electric

A Self-Shuttering Electronic Flash

In the mail comes news from Donald E. Witten at the U.S. Naval Ordnance Lab of an exciting new development there. The lab's aeroballistic research scientists have developed a new self-shuttering electronic flash which provides uniform illumination of very high intensity. The light is capable of instantaneously achieving and consistently maintaining the peak brilliance of ten GE #5 flashbulbs before abruptly shutting off without an afterglow.

NOL is utilizing the new flash to provide illumination for photographing missile models undergoing re-entry airflow shock tests lasting but a few thousandths of a second. Data from negatives exposed with the flash aids NOL in designing full-scale missiles that will withstand the terrific heat and pressure of re-entering the earth's atmosphere from outer space.

Before the self-shuttering light source was developed, NOL utilized chemical flash lamps and flash bombs of the commercial variety to illuminate the Laboratory's shock-tube re-entry tests. Abstracting valuable data from negatives exposed with these lighting systems, however, proved to be difficult because the negatives were not exposed to light of uniform intensity.

Previous Results Poor

Consequently, they contained only a few correctly exposed frames which were found somewhere in the middle of the light intensity range of the commercial systems. The remaining frames were always either underexposed due to too little illumination at the beginning and end of the light range, or overexposed because of too much illumination at the peak intensity of the light range.

Afterglow from commercial illumination systems also proved to be troublesome because of the continuous-writing nature of the high-speed camera required to record the split second shock tests. This camera receives a continuous image train which passes through an open lens and is reflected from a rotating mirror onto a film strip in a sequence of frames. Afterglow shining on the camera's spinning mirror after the test had been completed played additional light on the already exposed film and caused double exposure.

Simple Transmission Line

Essentially, the new self-shuttering light source is an artificial transmission line made up of a number of inductance coils and charged capacitors designed to match the impedance of a gaseous discharge tube. When discharged, the capacitors send alternating current racing first back and then forth through the line to terminate at the discharge tube.

After instantaneously lighting up at peak intensity and remaining that way for three one-thousandths of a second, the tube abruptly ceases to shine as the voltage across it from the capacitors suddenly drops to zero. Because the voltage immediately drops below the tube's deionization potential, there is no disrupting afterglow.

Illumination from the new light source is of sufficient intensity to expose Plus-X film to a density of one, through the *f*/27 optics of a Model 192 Beckman and Whitley High-Speed Framing Camera.

The illumination of missile mod-

continued on page 73

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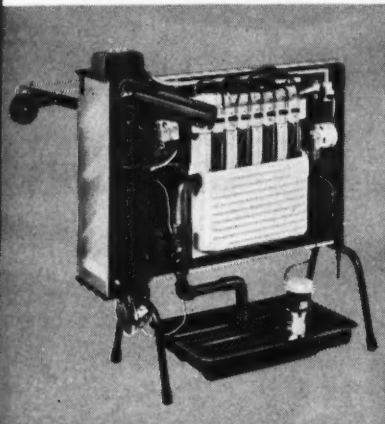

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european newsletter

michael j. langford

English Version of IP Awards

INDUSTRIAL PHOTOGRAPHY recently wound up its third annual awards for the best U.S. plant-produced non-theatrical films. England, too, has its version of the contest which, in fact, was worked out with the advice of the editors of IP. Robinson Rigg, editor of *Industrial Screen,* is responsible for initiating the contest over here.

This was an enterprising step and something wholly desirable as an incentive to British film-makers. It's a pity that the response he received — in terms of quantity and quality — was not perhaps as great as it might have been.

Some 58 films were submitted under seven categories: Sales and Advertising, Public Relations (most fell into these two classes), Recruiting and Industrial Relations, Accident Prevention, Production and Work Study, and Research Film Material. Judges consisted largely of films officers, public relations consultants and film distributors — the users rather than the makers. Twin awards were made in both the Sales and PR categories for the best film made solely within a company's resources and for the best film made with assistance from outside sources.

H. J. Vine's *Fetch the Minuteman* (British Oxygen) was judged the best internally-made sales film. With outside help the A.C. Delco Division of General Motors received the other sales award for its offering, *Hot Tip Story.*

The internally made Rentokil film *The Intruders* won an award for Public Relations. Its sequences of insect life recalled some of the Shell classics. Certain irrelevant 'cardboardy' backgrounds were irritating, but the film did at least send me scuttling home looking for cockroaches.

Esso, with outside help, received a PR award for *Pembrokeshire My County.* This film set out to establish good public relations for the company while building a refinery there, but resulted in a very conventional travelogue. (When the commentator glibly quotes cliches like "All too soon the gold of summer is fading" my enthusiasms tend to fade too.)

Other Winners

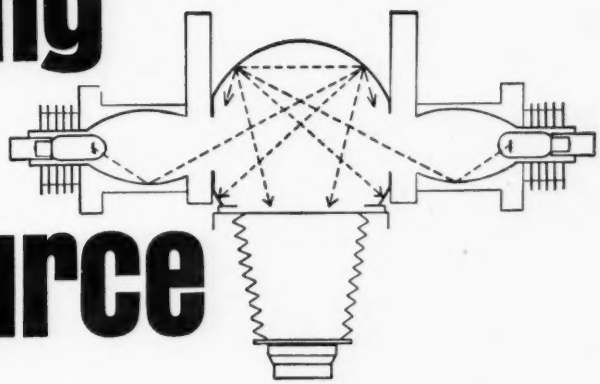
Day In, Day Out shows the advantages of Day Release Education to J. Lyons & Co. employees and received the award for Internal Relations. Parts of the notable road safety film, *Steering Clear,* produced, directed, photographed, edited and scripted by Ted Lambert, were judged the award winner for Accident Prevention.

Made for advanced driving instruction in his motoring school, the film is unsophisticated, direct and absorbing. In three years Ted drove 80,000 miles and made over six thousand takes to produce this film.

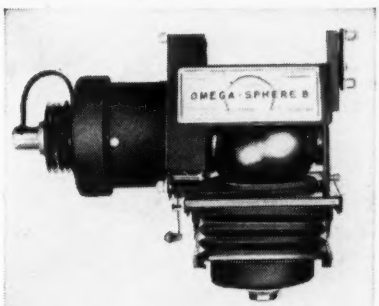
The Internal Training award went to I.C.I. Billingham for the functional *Plating Off a Gas Main.* Esso came in for another award with the production aid titled *Pile Casing at Milford Haven* and the Research award went for a few feet of Dunlop Research Department information, *Study of Tread Under Cornering Conditions.*

It seems probable that the Industrial Screen Awards in England will become an annual affair. For all their good qualities, 58 films give little room for selection. Mr. Rigg deserves to be sent far more material for future awards, particularly from small in-plant departments. □

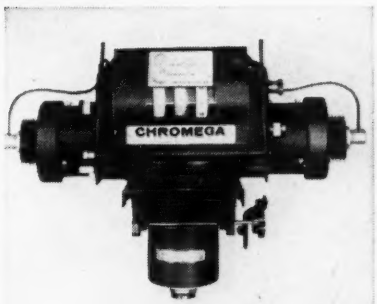
New Omega Integrating Sphere Light Source



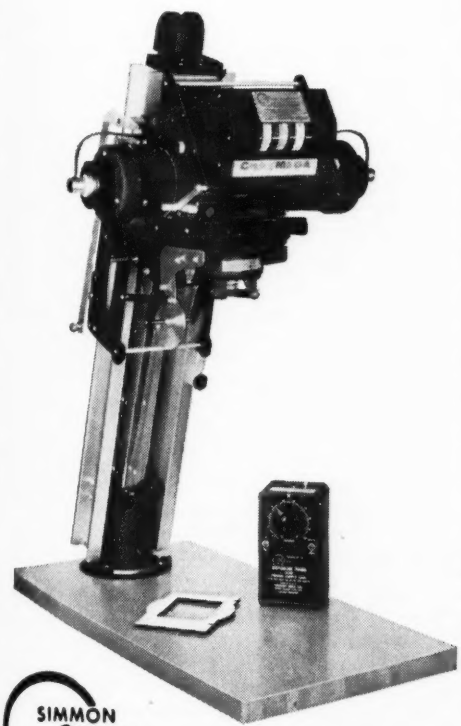
A must for color!
A blessing for black and white!



Omega-Sphere for black-and-white



Chromega for color



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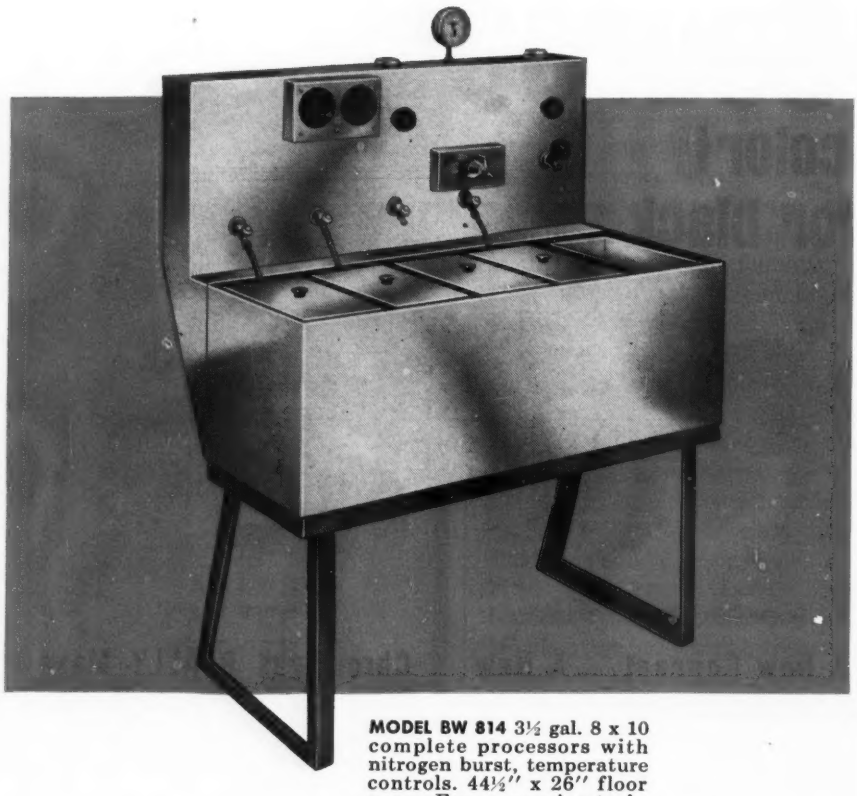

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Manufacturers of Cameras, Photographic Processing, Studio and Laboratory Equipment

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IP CALENDAR

Dec. 5-7 . . . Institute of British Photographers Industrial Photographers Conference, London, England.

Dec. 6-8 . . . "Document Copying by Photography," 3-day seminar arranged by the Royal Photographic Society, held at the Royal Society of Arts, London, England.

Dec. 11 . . . Monthly meeting of *Washington, D. C. chapter,* SPSE, with theme of "Astronomical Photography" at the U.S. Naval Observatory, 8:15 P.M.

Dec. 13 . . . Monthly meeting of *N. Y. chapter,* SMPTE, World Affairs Center, UN, N.Y.C. "Lighting for TV and Motion Pictures," a talk by Rollo Williams, director of color research and lighting at Century Lighting.

Dec. 20 . . . Monthly meeting of *N. Y. chapter,* SPSE, with talk titled "Preparation and Properties of Evaporated Film of Silver Bromide," by Dr. Gershon M. Goldberg, Technical Operations, Inc., Burlington, Mass. Carnegie International Center, N.Y.C. 8 p.m.

Jan. 25 . . . 14th annual dinner of IPAA *(NY.-N.J.)*

Feb. 15-18 . . . Western Trade Show of Applied Graphics, Shrine Exposition Hall, Los Angeles.

Regular Meetings

Rochester chapter, SPSE, meets on the second thursday of each month . . . Industry Film Producers Association, *Los Angeles chapter,* meets the first wednesday of each month . . . Southern California Industrial Photographers gather every third tuesday . . . Rocky Mountain Industrial Photographers gather every fourth monday in Denver . . . National Visual Presentation Association convenes every second thursday in New York . . . *New York chapters,* SPSE, SPIE, SMPTE and SRE meet on the first wednesday, third thursday, second wednesday and third monday respectively . . . *Binghamton chapter,* SPSE comes together every third thursday, while S. California SPSE meets last monday and Cleveland SPSE meets first tuesday . . . Association of Federal Photographers (Washington, D.C.) has meetings every third wednesday . . . *S. California* and *N. California* Biological Photographic Associations meet respectively on the third thursday and fourth friday of the month . . . *Chicago branch* of the same group has meetings every third tuesday . . . Minnesota Industrial Photographers Assn. holds meetings the first thursday of each month. . . . Industrial Photographers Association of America *(N.Y.-N.J.)* gathers on second thursdays.

To get information on any group listed above, or to get your society listed, drop a note to IP CALENDAR, c/o *Industrial Photography,* 10 E. 40 St., N.Y. 16, N.Y.

shop talk

WE ALWAYS PREACH that just as much photographic skill goes into a well-executed movie or engineering reproduction as into an award-winning still. Bearing us out is the Professional Photographers of America which has changed a bylaw so that industrial members "may now submit outstanding movie films, important graphic arts works, engineering photo reproductions or any photography done in industry for merit points leading to the coveted PP of A Master of Photography ". . . W. J. Davidson of Lockheed will head a new PP of A committee whose job is to work with other organizations implementing microfilm techniques. Davidson is an active and capable aircraft plant supervisor — a "natural" for the job.

NEWS FROM THE A-V FRONT: Donald P. Smith, supervisor of graphic arts services at International Harvester in Chicago, will head a newly-formed midwest chapter of the National Visual Presentation Association. It's the first regional group to be organized since NVPA was formed in New York City in 1952. The association's Ninth Day of Visuals will be held June 4 and 5 at the Hotel Roosevelt in N.Y. At press time NAVA was considering extending its 1962 convention from four to five days.

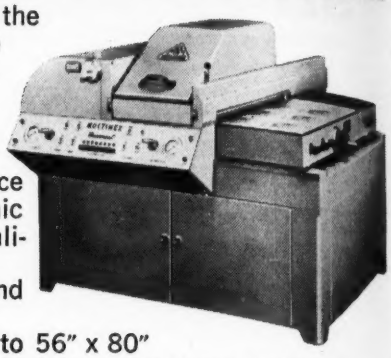
SUPERSONIC EYES OF THE FLEET is the handle given by the Navy to its covey of F8U-IPs — the world's fastest carrier-based photo planes. The one shown at right wings across Pearl Harbor, with Honolulu above it. When the Navy had Ling-Temco-Vought produce the F8U-IPs it equipped them with miniature 70mm CAX-12 cameras which take good photos at a 700 per cent reduction in film cost over older types of aerial cameras. Image motion compensation features move the film at time of exposure in the direction of flight to compensate for the forward speed of the aircraft. An exposure meter built into the underside of the plane enables the pilot to set his camera correctly for different light conditions. If night photographs are desired the plane carries a quantity of magnesium flares which are ejected from behind the pilot's cockpit. The flare fires like a flashbulb, enabling the camera's open shutter to record the ground below. Pilots with the squadron are graduates of the Navy's six months course for photo pilots at Pensacola, Fla. Upon joining the squadron they get an additional year's training in fleet techniques of picture-taking.

JAMES WILKENS of Philco's photo unit has just been made chairman of the Industrial Committee of the Society of Commercial Photographers in Philadelphia. This committee arranges special features which are restricted to Society members in industrial photographic departments.

A NAME, PLEASE! Editors of the Northern California SPSE bulletin, which saw the light of day this September, are wondering what to call their new effort. Can any frustrated journalist help them out? The bulletin recounts an exciting supper meeting at which members and friends navigated bumpy roads to visit the Lick Observatory on Mt. Hamilton. Everyone peered through the 120-inch telescope, and 36-inch refracting telescope, then toured the darkroom facilities. In the early evening hours the various stars and planets were observed through the 12-inch telescope. (Wish we'd been there!)

PHOTOS AND ETCHINGS are displayed side-by-side in a current exhibition at the N.Y. Metropolitan Museum of Art which reveals similarities as well as dramatic contrasts in the two art forms. Richard Avedon's action shot of Marian Anderson with her hair streaming wildly in the wind as she sings is linked with an Honore Daumier lithograph, while an Italian etching is paired with Irving Penn's "Broken Egg."

MICROMINIATURIZE TO PINPOINT PRECISION
BY AUTOMATIC STEP & REPEAT ON THE ROYAL ZENITH MISOMEX



Miniature circuitry patterns are completed in minutes—accurate to .001 over the entire exposure area—on the automated MISOMEX. Starting with one simple piece of artwork the MISOMEX automatically positions and exposes in regular, stepped or staggered patterns, with simple push-button control. Automatic microminiaturization on the MISOMEX cuts time and labor costs to a minimum, eliminates human errors.

MISOMEX is the only automatic step-and-repeat machine now in use to produce microminiaturization assignments. For a wide range of tasks in electronic circuitry, companies like IBM, Itek, Buckbee Mears, Etching Company of California and other leading electronics firms use MISOMEX.

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FROM

one piece of artwork like this

THROUGH

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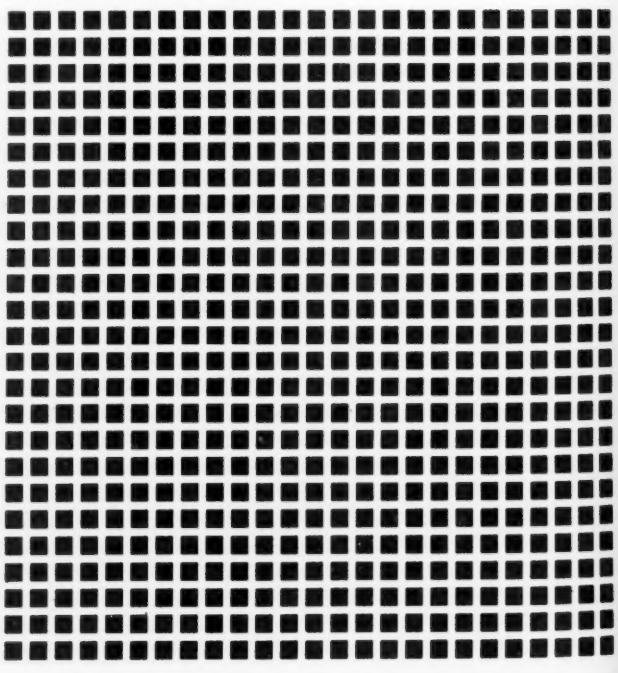

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INDUSTRIAL PHOTOGRAPHY

DECEMBER 1961

VOLUME 10 NUMBER 12

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EDITORIAL

The Well-Rounded Specialist

Professional photography tends to become more specialized every year. This trend is a natural consequence of the profession's increasing complexity. The serious worker must specialize if he is to excel. And he must excel if he is to compete successfully in this talent-laden field.

Generally the result of specialization is superior products. An unfortunate characteristic, however, is a diminishing number of practitioners capable of taking an all-embracing view of their profession.

How many photographers possess a really broad outlook and knowledge of the whole of photography? How many are conversant with what is happening in photography in other parts of the world? How many take an interest in product developments which do not now affect their particular specialty? Yet today's startling new motion picture product may tomorrow change the course of still photography – or vice versa. Witness: developments in rapid film processing.

If we are not to stagnate it is necessary that all of us in photography look at its implications as a whole. Such a view of the field is especially essential for photographic administrators. Any industrial photographic department head worth his salt is ever trying to come up with new applications for his medium. But if his view of the field is narrow – no matter how deep – the chances are that he won't even recognize many opportunities for photography to do a job when they present themselves.

There are means at hand for keeping up with what's going on outside of your specialty. Take photo conferences. Most of us go through the printed program checking off for our attention those presentations directly related to our particular area of activity. How about next time sitting in on some that aren't, instead of going out for coffee? In fact, how about attending some conference of specialists in a photographic field other than your own? You might be pleasantly surprised to come out of it with something you can use.

Of course, we like to believe that the best way for the industrial photographer to "keep up" is through fully utilizing the pages of this magazine. By "fully utilizing" we mean not only reading articles outside of your specialty, but using such keys to additional information as our free literature card.

Processes up to 150 ft. of film per min.

When your 16mm and 35mm black and white film processing requirements call for high speed and/or high volume, the Houston Fearless Model S120PN Rapid Spray Processor will do the job superbly well. High-impingement jet-spray application of the developing solution, fix and wash (as well as impingement drying) makes possible processing of positive film at 150 f.p.m., negative film at 100 f.p.m. Complete cycle at top speed is only 5 minutes, dry to dry.

Fully automatic operation plus highly accurate temperature controls (within ±¼°F) assure uniformly fine results. Solution reservoir (adjustable to 5 or 10 gal. capacity), permits alternating between neg. and pos. processing. The machine also features a direct, positive film drive, automatic film-tension control, efficient air squeegees and electric tachometer. Wax or silicone applicator and archival wash are optional. Stainless steel throughout. Write or phone for brochure and prices. Immediate delivery.

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What You Need to Know About Repro Papers

by HAL DENSTMAN,
Photographic Supervisor, Lockheed Electronics

Inadequate communication between a company's drafting (or art) department and the photo-reproduction lab usually results in lost time, increased costs and unnecessary headaches for the photographic technician. It all traces back to the random selection of paper on which art work or engineering drawings are originated.

The problem arises simply enough. The draftsman or layout artist gets specifications for a particular drawing or piece of artwork but is not necessarily informed about the final uses to which his work will be put. Equipped with the knowledge for creating the art, but not always aware of what materials will reproduce well photographically, the layout man chooses a drawing medium out of the available supply. In many cases, the material he chooses will produce satisfactory diazo prints or blueprints. But, in many situations the end result won't do.

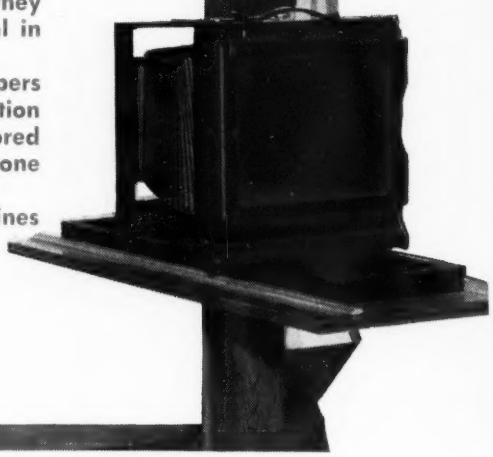
The photo-reproduction department should be on the alert for problem areas, such as non-reproducible papers, poor reflective surfaces, faded or discolored stocks, etc. The photographic supervisor should list the qualifications for good copies with the drafting and/or art department and he should provide these departments with a guide for stocking suitable materials. He should specify exactly what materials reproduce best by the reproduction methods his company utilizes. For maximum overall quality, the papers used should be selected with the same scrutiny that the draftsman applies to pencils and ink.

The final selection of materials best suited for any operation is in good part a matter of judgment, testing and experience but this must be preceded by an understanding of the basic qualities of the materials. For example, in many uses, paper has obvious advantages and specific types of papers the most advantages. In other applications, paper may not be the ideal medium.

Listed here, for your guidance, are the desirable characteristics of reproducible papers and cloths (A) for camera reproduction and (B) for diazo and blueprint reproduction; reproduction properties of paper; a brief directory of leading paper manufacturers and their products; and an alphabetical reference to the various characteristics of paper.

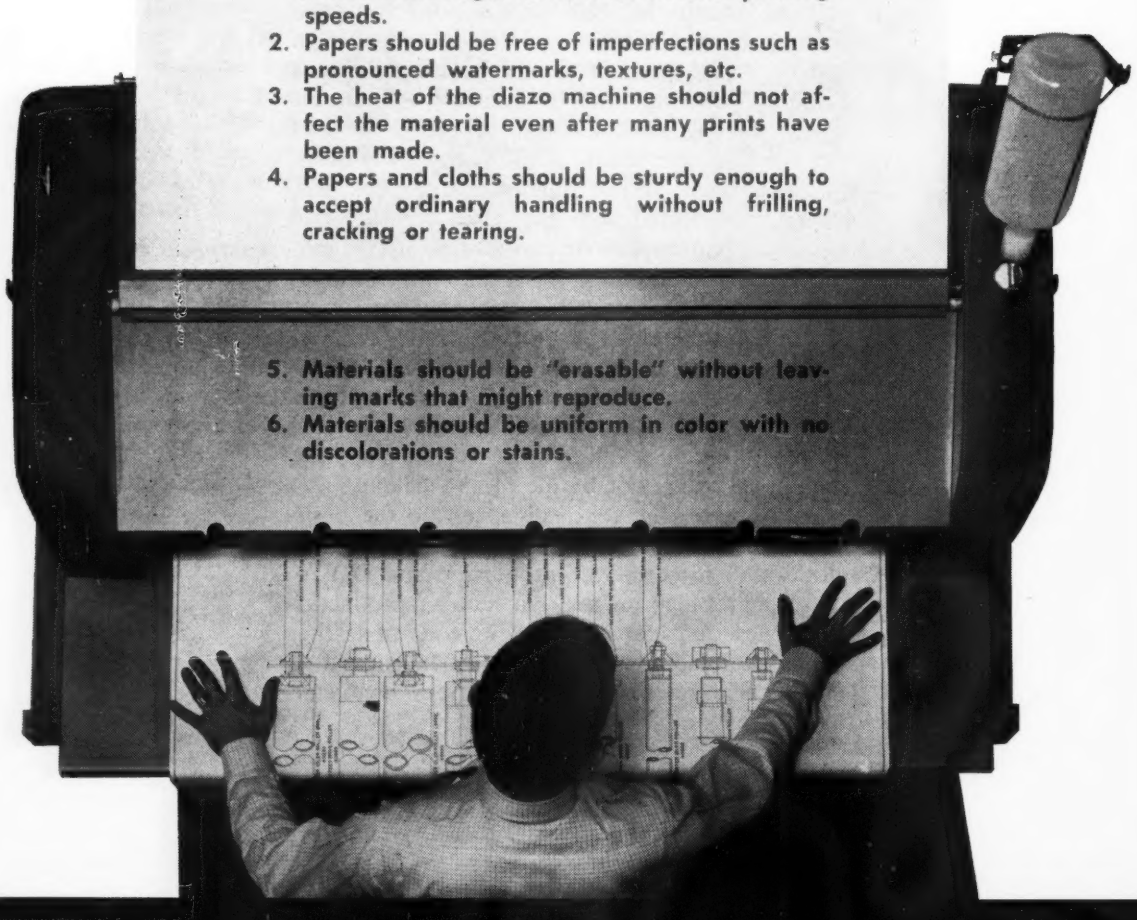
For Camera Reproduction

1. Paper should have high reflectivity.
2. Opaque materials are most suitable since they eliminate the need to back up the original in the copy easel.
3. Materials should be white. Colored papers may have to be filtered for line reproduction if they present an exposure problem. Colored papers are acceptable for continuous tone copies.
4. Papers should not "blot" ink, or sharp lines will be impossible.



For Diazo and Allied Reproduction

1. Papers should be capable of transmitting sufficient actinic light for normal machine printing speeds.
2. Papers should be free of imperfections such as pronounced watermarks, textures, etc.
3. The heat of the diazo machine should not affect the material even after many prints have been made.
4. Papers and cloths should be sturdy enough to accept ordinary handling without frilling, cracking or tearing.
5. Materials should be "erasable" without leaving marks that might reproduce.
6. Materials should be uniform in color with no discolorations or stains.



PROPERTIES OF PAPER

1	**STOCK**	The quality of rag content. Pulp which has been refined, sized, colored and made ready for forming into paper.
2	**STRENGTH**	Rated as: *Highest Grade, High Grade, Rag.* Defined as relative to that of other papers of the same weight. Rated as: *Very Strong, Strong, Fair.*
3	**PERMANENCE**	Aging qualities of the material. Rated as: *V. Good, Good, Fair.*
4	**TRANSPARENCY**	Light transmission properties of the paper. Different ratings are used for transparent or translucent materials as opposed to ordinary materials. Rated as: *Excel., Very Good, Good, Fair.*
5	**WEIGHT**	The weight of papers is rated as "Sub.25," "Sub.30," etc. Substance (Sub.) followed by a number refers to the approximate weight of 500 sheets of paper measuring 17 x 22". Thus, Sub. 25 means that 500 sheets of 17 x 22" paper weigh approximately 25 pounds.
6	**ERASING QUALITY**	Refers to the ink erasing qualities. Rated as: *Perfect, Very Good, Good, Fair.*
7	**ROLL, QUIRE, REAM**	Papers are usually sold by the roll, which varies in width and length; by the quire (24 sheets); and by the ream (480 sheets).

PAPER PRODUCERS & PRODUCTS

COMPANIES	Translucent	Transparent	Tracing	Diazo, Dry	Diazo, Moist	Diazo, Cont.	Non-Repro Grid
AETNA DIVISION	●						
ADELPHI RSCH/MFG.			●	●		●	
ALVIN & CO.			●				
AZON CORP.			●	●	●		
BEE PAPER CO.			●				●
BIENFANG PAPER	●		●				●
CHAS. BRUNING			●	●	●		●
H. COLE CO.				●	●		
CLEARPRINT PAPER			●				●
EUGENE DIETZGEN			●	●	●	●	●
DITTO, INC.				●			
DUOPHOTO CORP.					●		
B. K. ELLIOT CO.			●	●	●		●
FITCHBURG PAPER			●				●
HAMMERMILL	●						

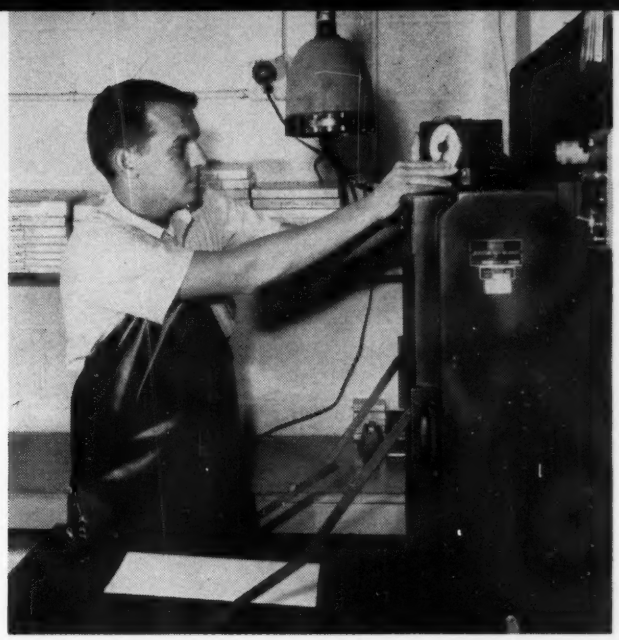
COMPANIES	Translucent	Transparent	Tracing	Diazo, Dry	Diazo, Moist	Diazo, Cont.	Non-Repro Grid
KEUFFEL & ESSER			●	●	●	●	●
KEYSTONE BLUE			●	●	●		
KIMBERLY-CLARK	●						
OZALID DIVISION			●	●	●	●	●
FRED. POST CO.			●	●	●		●
PATTERSON PARCHMENT	●						
L. L. RIDGWAY			●	●	●	●	
STANDARD PAPER	●						
SORG PAPER	●						
STAN-TONE INC.			●	●	●		●
STRATHMORE	●	●					
SOLAR PRODUCTS				●	●	●	●
TECNIFAX			●	●	●	●	
U.S. BLUEPRINT			●	●	●		●
J. H. WEIL CO.			●	●	●		●

ALPHABETICAL REFERENCE TO CHARACTERISTICS OF PAPER

ACTINIC OPACITY	Opacity to actinic light. The general actinic light blocking properties of pencil, ink and dye images applied to paper.
ACTINIC TRANSPARENCY	Transparency to actinic light (high in UV).
BASE COLOR	Dyed image of paper or cloth stock, such as light blue linen drawing cloth.
BRIGHTNESS	Reflective properties of paper for blue light, measured with appropriate filters.
BRITTLENESS	Characteristics causing materials to crack.
BURSTING STRENGTH	Resistance of a sheet to pressure.
CALENDER CUTS	Defects caused by wrinkles in the paper as it passes through calender rolls.
CALIPER	Sheet thickness in thousandths of an inch.
CARBON BACKING	Reinforcing a typed or drawn image with carbon paper which reproduces the same image on original's back.
CARD STOCK	Heavyweight paper, usually over .006 in caliper.
CHEMICAL WOOD PULP	Cellulose fibers obtained through processing of wood pulp.
COCKLE	Spot in paper due to shrinkage while drying.
CROSS DIRECTION	Sheet curvature.
CURL	Direction at right angles to grain direction.
DRAWING PAPER	Fairly opaque and uniform sheet for making pencil or ink drawings for camera reproduction.
ERADICATOR	Chemical for removing ink or dye images.
FEATHERING	Spreading or bleeding of ink lines.
FILLER	Insoluble material used in the papermaking process for modifying opacity, texture, weight, etc.
FINISH	Surface property of paper determined by its surface, contour and gloss.
FOLDING ENDURANCE	Number of times the sheet can be folded before tearing.
GLASS CLOTH	Drawing medium of woven glass filaments.
HARD-SIZED	High degree of water resistance.
HYGROSCOPIC	Tending to absorb and retain moisture.
MATTE FINISH	Dull, gloss-free surface which may have a texture.
MILL ROLL	Roll of paper as it comes from paper machine reel.
MYLAR	Trade name for polyester material.
NON-REPRODUCIBLE	Lines not reproducing in machine printing.
OPACITY	Ability to hold back light.
SHRINKAGE	Reduction due to wetting and drying.
SURFACE COLORING	Applying color to paper.
TOOTH	Surface accepting ink pencil.
TRACING PAPER	Translucent sheets for making pencil or ink drawings. Suitable for tracing.
TRANSLUCENT	Semi-transparent, not clear, but capable of transmitting diffused light.
VELLUM	Lightweight translucent materials.

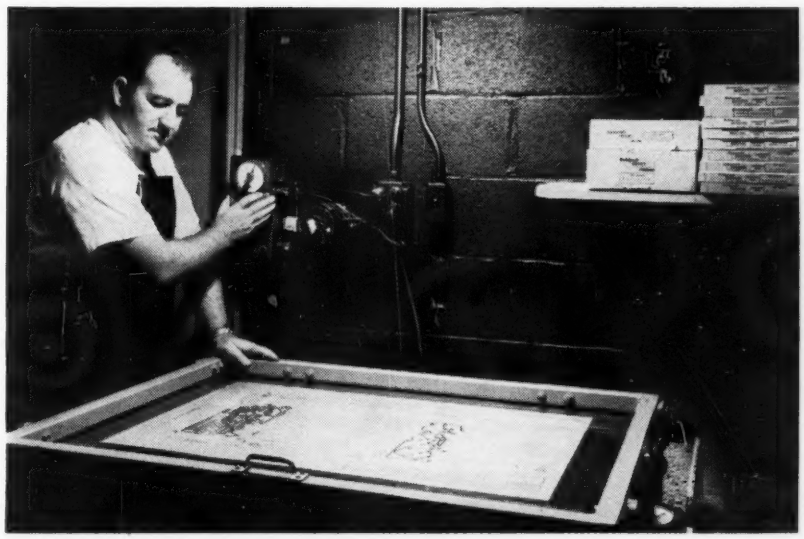
A complete glossary of terms used in the diazo and blueprint field is available for $1 from the National Association of Blueprint and Diazotype Coaters, 1757 K Street, N. W., Washington 6, D. C.

Cures for Reflection Problems



HERE IS A simple set-up for flashing Kodak's Autoscreen film or other types of halftone negatives: Two safelights have been mounted on an aluminum bracket which is mounted over the vacuum back on the copy camera. One safelight housing holds a red filter for general illumination while the other holds an OA yellow filter and 25-watt bulb. The average flashing time for autoscreen film is 25 seconds, with light at four feet. Flashing lamp hooks to second timer to simplify timing of flash exposure.

Rx for this malady calls for an equipment check-up plus lots of black paint.



EVEN CONTACT areas where projected light sources are utilized should be painted with flat black paint.

With all the variables that might affect the overall quality of a negative, probably the most troublesome and destructive conditions the reproduction cameraman must deal with are reflections and light flare. Much has been done in the past few years to eliminate lens flare and reflections: Lens makers have coated lenses, film manufacturers have added anti-halation backings on films, and camera manufacturers have produced non-reflective flat black finishes for the inside of camera and bellows. However, all of these advancements and refinements have not completely eliminated the unwanted effects of light reflections, although they have lessened the problem considerably.

Paint Room Black

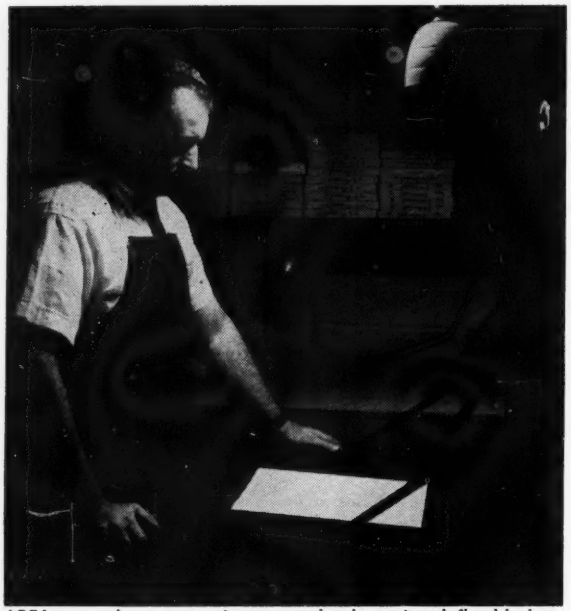
What can you do if you have a suitable camera and a good coated lens but still have reflection problems? It's simple — just paint your camera room black. After giving this advice to an interested listener he often expresses reactions ranging from amusement to bewilderment.

It seems that most modern-day reproduction men are also *thinking* modern, and the color schemes for their camera rooms are extracted from interior decorating magazines. However, if optimum quality reproduction negatives are the goal, fancy color schemes should be thrown out.

When an original drawing or photograph is illuminated for reproduction, it is usually impossible to avoid picking up reflections from surrounding objects. The stronger the light source, the stronger the reflections. When you use light sources such as arc lamps, mercury vapor lamps, electronic flash tubes and high intensity flood lamps it is obvious that the bright light will reach other parts of the camera room and consequently, produce reflections.

Bounce Light

If the camera room is fairly small, with low ceilings, there



AREA around vacuum printer can also be painted flat black to minimize reflections from surrounding objects, thereby assuring higher overall contrast throughout entire negative.

CAMERA ROOM at Lockheed Electronics (Plainfield, N. J.): Fluorescents overhead turn off automatically when arc lights go on. Walls and ceiling are painted flat black.

may be difficulties encountered from light bouncing off of the walls and ceiling. If the walls and ceiling are light-colored, the reflection problem is almost guaranteed. The copy easel is probably the other likely object to contribute to reflection — if it is not painted flat black.

Paint Easel Black

The easel, being directly in front of the lens, should always be painted with flat black non-reflective paint to prevent any serious light reflections. If transparent or translucent originals are to be reproduced, a sheet of opaque white paper should be interposed between the original and the black easel to increase background density.

Reflections in Lens

Part of the light reflected from surrounding objects is passed through the lens, where it undergoes numerous reflections on the elements of the component lenses. It is then reflected back toward the copy easel. Another portion of the light is absorbed by the black matte finish inside the bellows. The balance of the light, however, is dispersed over the entire emulsion of the film at the film plane.

Contrast Reduced

These "diffuse" light particles will do damage to the image by lowering the overall contrast of the reproduced subject matter, especially in the shadow areas of a continuous tone negative, and in the clear areas of a process negative. With uncoated lenses the "diffuse" light may be as high as fifteen per cent of the light reflected from the highlights of the original being copied.

The actual effects of lens flare and reflections from surrounding objects may not be noticed under normal working conditions, but a simple comparison test can demonstrate the difference:

"Average" Conditions

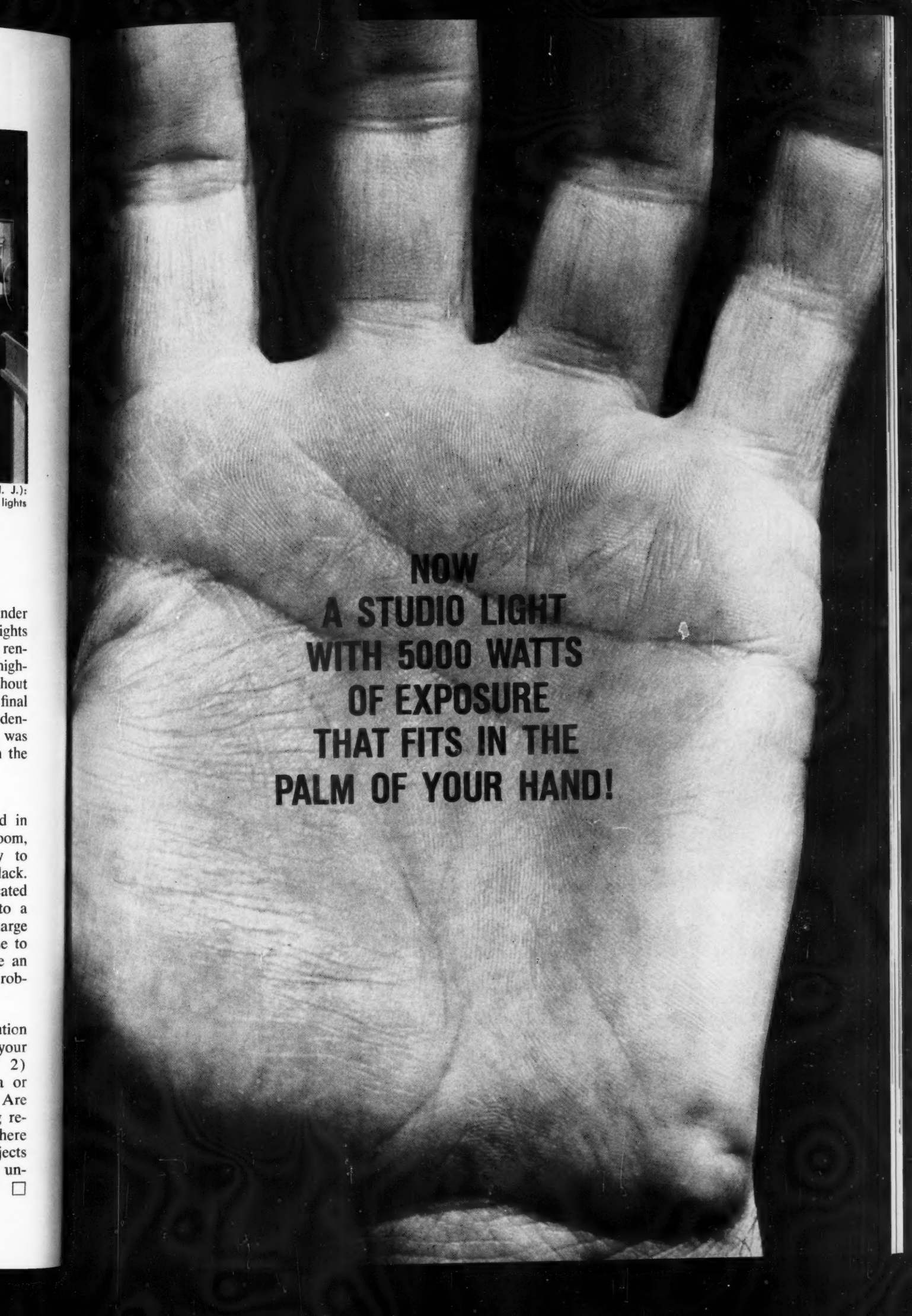
First, copy the photograph under these "average" conditions which I will arbitrarily set up: room lights on, copy easel not black, camera room with light-colored walls and ceilings. Then copy it again under more suitable conditions — room lights out, with copy easel, walls and ceilings painted flat black. Under proper conditions the highlights and shadow areas will be rendered more faithfully, with higher overall contrast throughout the entire negative. The final comparison, if made with a densitometer, would prove there was a marked difference between the two negatives.

Centering Saves Painting

If your camera is located in the center of a very large room, it would not be necessary to paint the entire room black. However, if the camera is located in a small room, or next to a light colored wall in a large room, painting the area close to the camera flat-black can be an excellent cure for reflection problems.

Checklist

To capsulize the solution check these points: 1) Is your lens coated to prevent flare? 2) Is the inside of the camera or bellows non-reflective? 3) Are your walls or ceiling causing reflection problems? 4) Are there any light colored or shiny objects in the room that could cause unwanted reflections? □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THAT FITS IN THE
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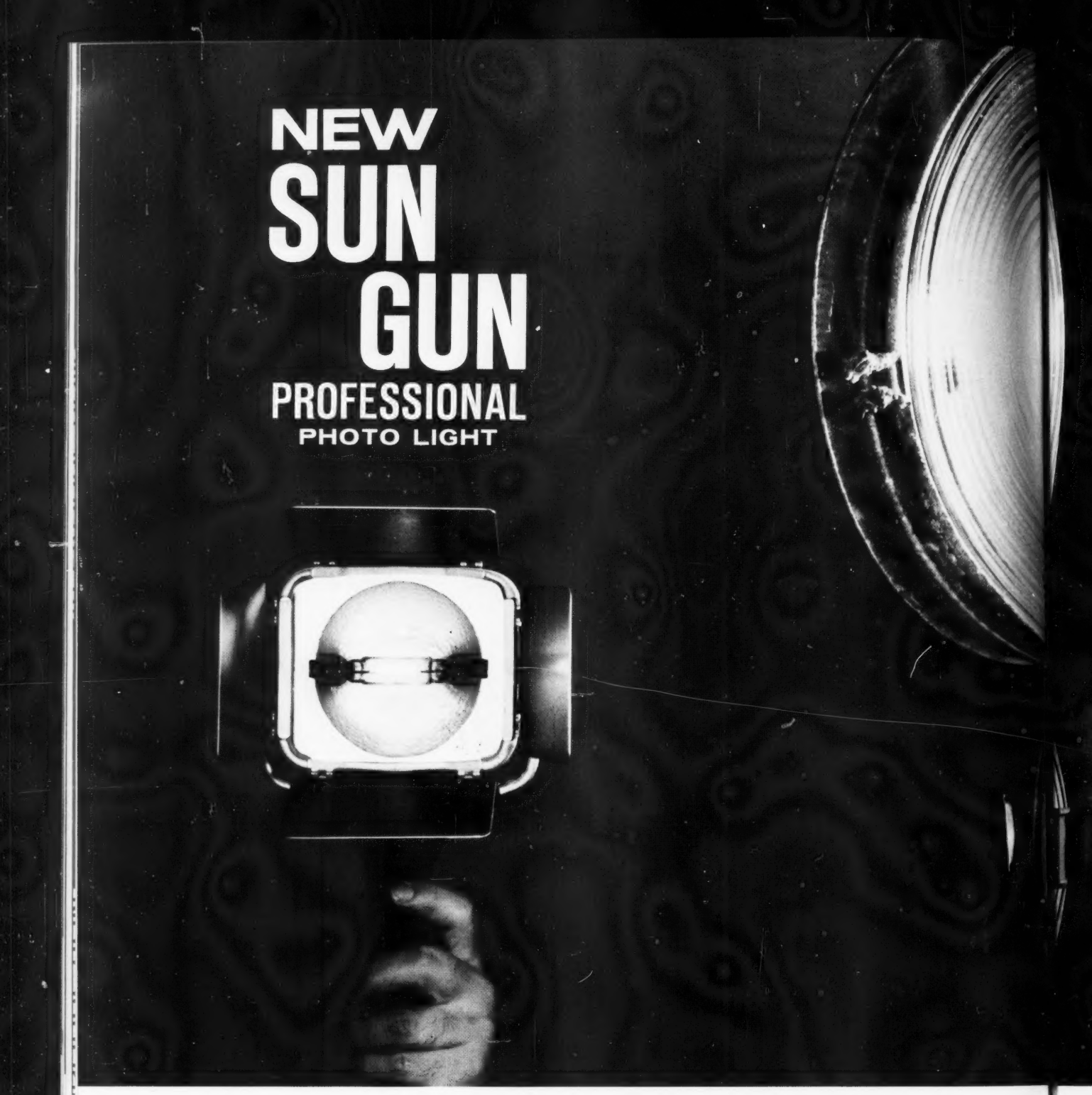


takes the place of studio lights 10 times bigger...

This is the compact new photo light that has started a revolution in studio lighting. It's a specially engineered PROFESSIONAL version of the SUN GUN home movie light, invented by Sylvania, that major Hollywood studios have already adopted.

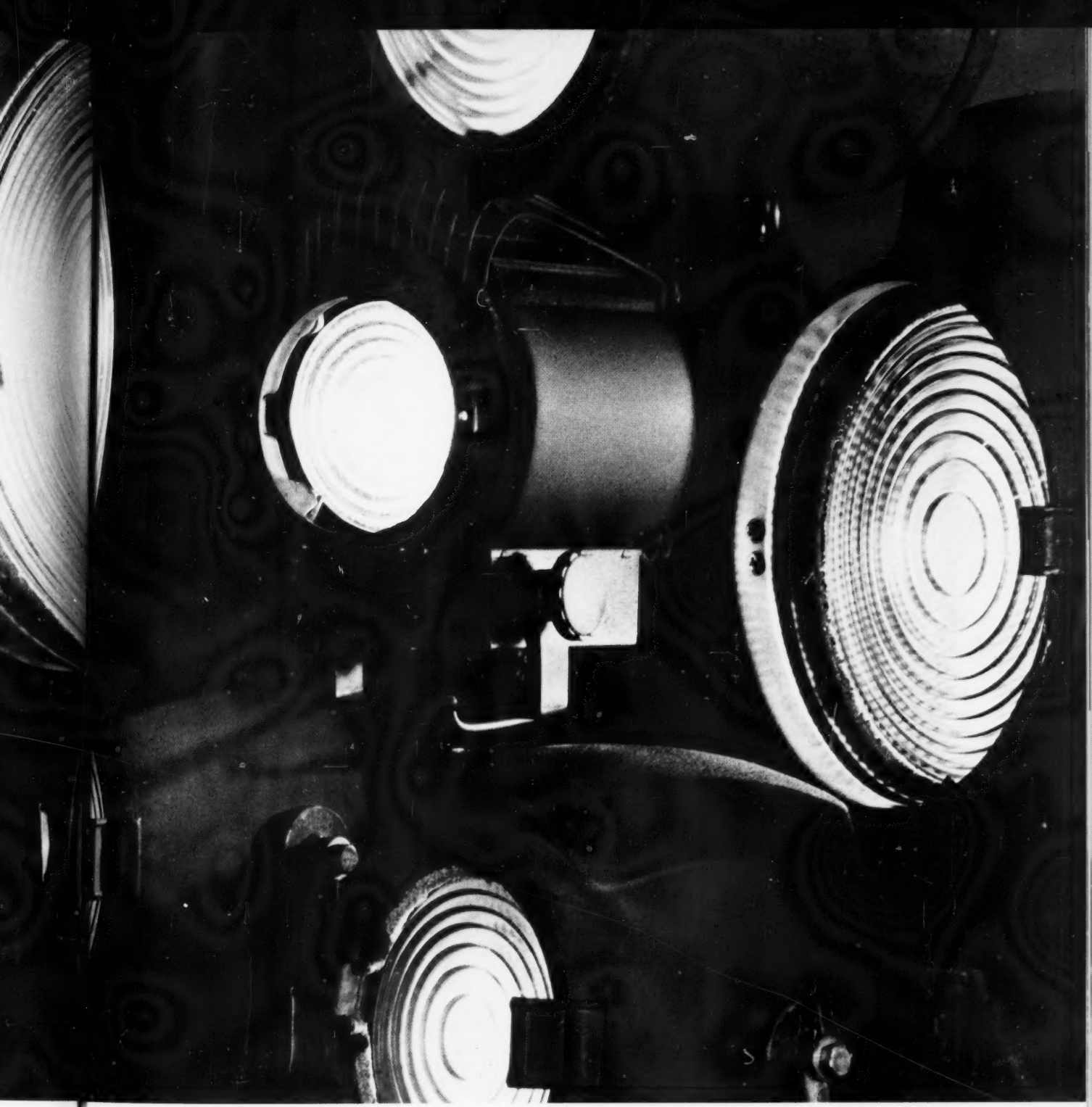
The SUN GUN PROFESSIONAL is so small it actually fits in the palm of your hand. So powerful it produces 5,000 watts exposure . . . at only 1000-watts electrical cost. So versatile that it easily does the work of most studio lighting equipment . . . and does it better! And the SUN GUN PROFESSIONAL weighs only 3 pounds!

Unlike regular studio equipment, SUN GUN PROFESSIONAL is inexpensive to buy, inexpensive to maintain, inexpensive to ship on location. What's more, SUN GUN maintains original brightness and color temperature for the entire life of the lamp . . . without reducing lamp life!

Where does SUN GUN get its fantastic brilliance? For one thing, it has an amazingly powerful 1000-watt High-Silica Halogen lamp with 65,000 center beam candlepower. It also has a *special reflector* with over 750 light-intensifying surfaces. The result is an intensely bright light that floods the scene like the sun. Light smooth and even. Balanced to 3400°K for indoor color film use. Instantly replaceable lamp has 12 hours' average life.

SUN GUN PROFESSIONAL is completely adjustable. Head can be aimed in any direction. Beam spread is 30° vertical, 36° horizontal. Complete with portrait lens, flood lens, metal barn doors, and 12-foot cord.

Sylvania Lighting Products, Division of Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.



bigge...10 times heavier...10 times more expensive!

SEE NEXT PAGE FOR COMPLETE DETAILS ON BUILT-IN FEATURES AND SPECIALIZED STUDIO ACCESSORIES.

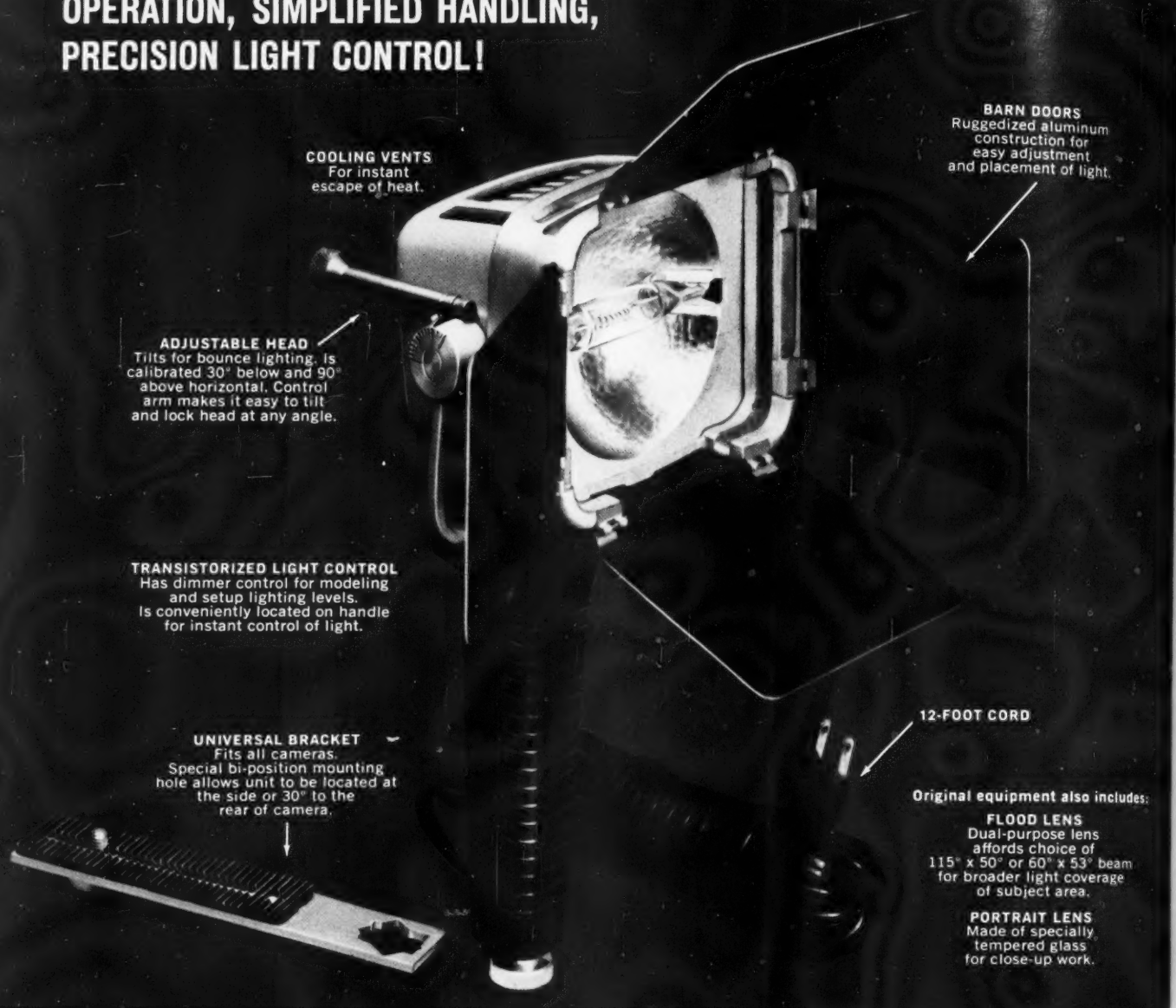
SYLVANIA

SUBSIDIARY OF

GENERAL TELEPHONE & ELECTRONICS

GENERAL SYSTEM

SUN GUN PROFESSIONAL PHOTO LIGHT IS FULLY EQUIPPED FOR EFFICIENT OPERATION, SIMPLIFIED HANDLING, PRECISION LIGHT CONTROL!


COOLING VENTS
For instant escape of heat.
BARN DOORS
Ruggedized aluminum construction for easy adjustment and placement of light.
ADJUSTABLE HEAD
Tilts for bounce lighting. Is calibrated 30° below and 90° above horizontal. Control arm makes it easy to tilt and lock head at any angle.
TRANSISTORIZED LIGHT CONTROL
Has dimmer control for modeling and setup lighting levels. Is conveniently located on handle for instant control of light.
12-FOOT CORD
UNIVERSAL BRACKET
Fits all cameras. Special bi-position mounting hole allows unit to be located at the side or 30° to the rear of camera.

Original equipment also includes:

FLOOD LENS
Dual-purpose lens affords choice of 115° x 50° or 60° x 53° beam for broader light coverage of subject area.

PORTRAIT LENS
Made of specially tempered glass for close-up work.

Full range of optional accessories quickly adapts SUN GUN for every studio lighting need!

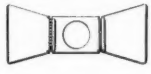
Accessory holder. Adapts SUN GUN to accept the following wide variety of specialized optional accessories:

Daylight filter. Corrects color temperature of basic 3400°K lamp to permit use with daylight type color film. Eliminates need to correct light with camera filters that reduce efficiency of fine camera lenses.

Snoots. Provide a finely controlled beam for spot highlighting of small areas. Two sizes—large and special optical "Sniper Snoot."

Carrying case. For convenient carrying of SUN GUN and accessory lenses.

Super-spread lens. Spreads beam to match field of extra-wide-angle camera lenses. For use with large barn doors or accessory holder.



Large barn doors. Permit horizontal control of light beam to conform to specific area lighting requirements or to keep light out of camera lens.

Special 3200°K filter. High-silica glass, accurately balanced for Type B film.

Diffusing filter. Spun-glass scrim provides soft, even, diffused light for close-up work. Includes removable spread lens.

Sylvania Lighting Products
Division of Sylvania Electric Products Inc.
1740 Broadway, New York 19, N. Y.

Please send me free technical information on the new SUN GUN PROFESSIONAL Photo Light.

Name_____

Address_____

City_____ Zone____ State_____

MAIL COUPON TODAY FOR MORE INFORMATION

SYLVANIA

SUBSIDIARY OF
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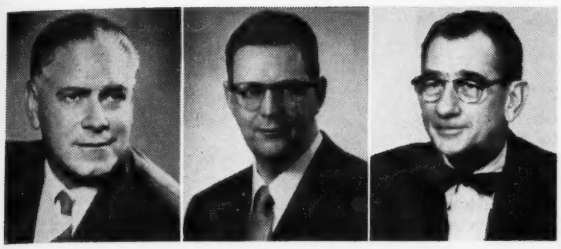
VCC

The West Coast will play host to scores of photo-reproduction and systems specialists attending SRE's Annual Visual Communications Congress this month.



ELECTROSTATIC printing systems panelists: L-R, Donald Alnutt, Philip A. Hunt Co.; C. S. Margach, Addressograph-Multigraph Corp.; G. T. Gerlach, A B. Dick Company.

OTHER panelists: L-R, Leonard Florsheim, Jr., Robertson Photo-Mechanix, Inc. (Electrostatic Printing); Robert Munch, Charles Bruning Co. (Blueprint); J. E. Dietzgen, Eugene Dietzgen Co.

Want to see an electrostatic camera/processor that automatically makes complete runs in 60 seconds? Pre-press color proofing systems to check color break, value and register before the lithographic plate is made? Shelf-drawer files? These and many more developments perfected by over 100 companies will be on display for your viewing in a 75,000-square-foot area at the coming Visual Communications Congress. The gathering — a 'must' for reproduction specialists — convenes December 2-5 at Los Angeles' Biltmore Hotel.

Sponsoring this whopping-big show will be the Society of Reproduction Engineers, in conjunction with the American Institute of Design and Drafting and the American Records Management Association. Members of these groups involved in all phases of industrial reproduction will be present. They include managers and technicians of in-plant graphic reproduction/visual communications services, as well as draftsmen and all levels of administrative personnel.

Miniaturizing Systems Program

Kicking off the four-day gathering will be a seminar on Saturday jointly sponsored by the SRE, AIDD and ARMA. Subject of the meeting is "Today's Programming and Tomorrow's Progress in Miniaturization Systems for American Business, Government and Industry."

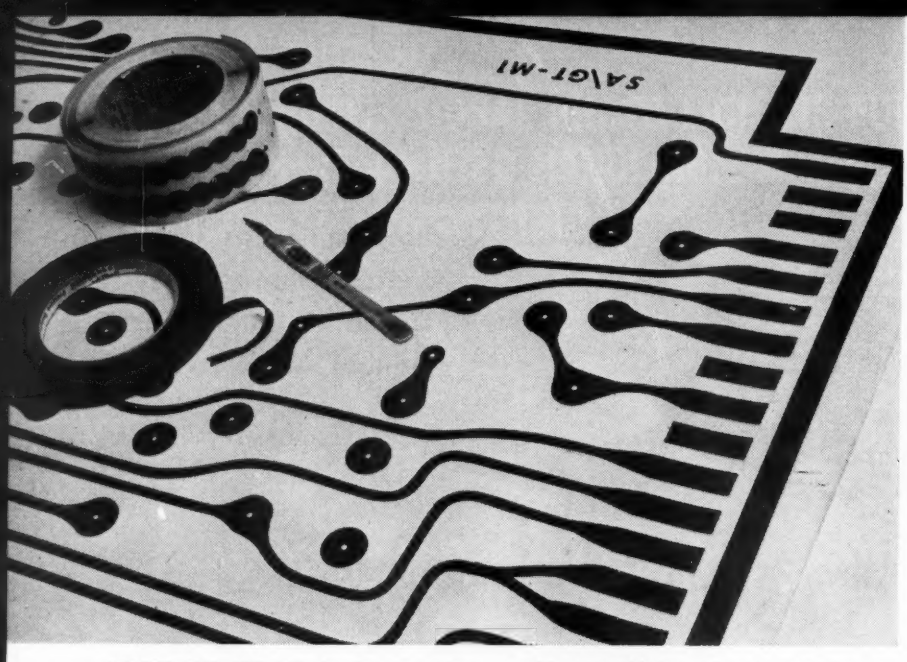
Six lively sessions, each organized by one of the three sponsoring groups, will be scheduled on Monday and Tuesday. Two are under the aegis of the SRE, and will hold particular interest for reproduction specialists. One is a seminar on electrostatic printing systems slated for Monday. Chairman Russell DeRosa of Ford Motors will lead the following panel: G. T. Gerlach, A.B. Dick; Donald B. Alnutt, Philip Hunt; C. S. Margach, Addressograph-Multigraph; Stuart Arnett, RCA; Leonard Florsheim, Jr., Robertson Photomechanix; Albert Dunning, Plastic Coating Corp.

The second, on the docket for Tuesday, will touch on the future of blueprinting. Its title is "Tomorrow's Progress in Diazo and Blueprint Systems." Panel members have each taken one area of this broad topic: Blueprint, Robert Munch, Charles Bruning; Paper, J. E. Dietzgen, Eugene Dietzgen; Coating, William Beese, Azon. Representatives from Tecnifax and Bell and Howell will cover diazo and filming, respectively. William J. Burdick, U.S. Naval Ordnance, is chairmaning the meeting.

Program Coordinators

The following men—leaders in the SRE, AIDD and ARMA—are coordinating the program for the 1961 VCC: Russell H. DeRosa, Ford Motors, SRE; N. N. Freling, Phillips Petroleum, AIDD president; VCC General Chairman H. E. Shimp, Lockheed Aircraft, SRE; William Benedon, Lockheed Aircraft, ARMA president; William Burdick, U.S. Naval Ordnance, SRE.

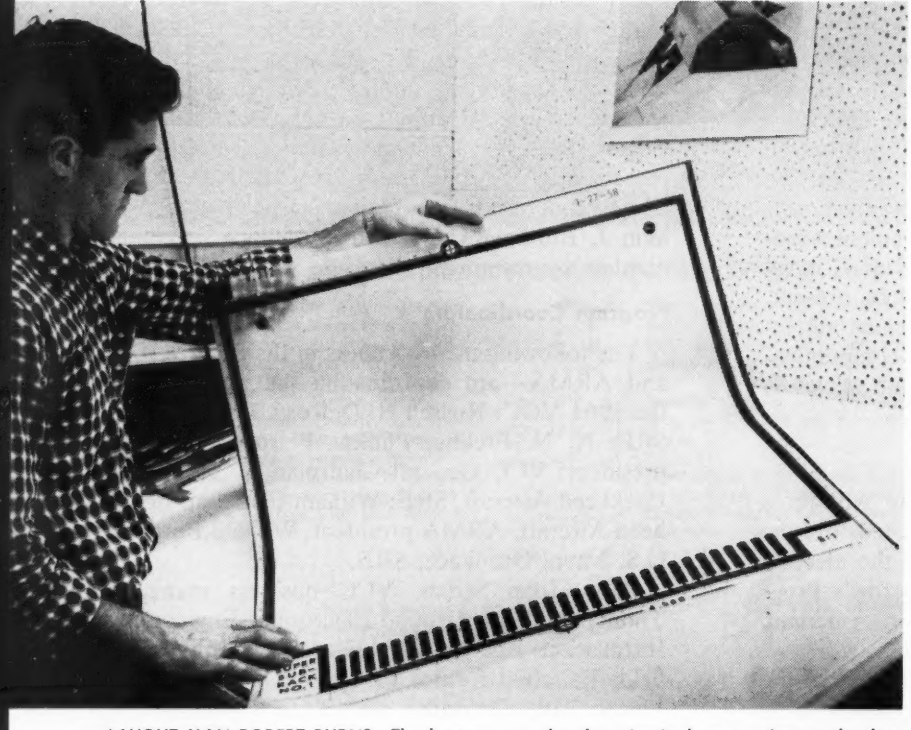
Also, John Sedan, VCC business manager; Thomas H. Tutt, Ground Electronics Engineering Installation Agency, USAF, AIDD; John Rayfield, Fairchild Stratos Corp., AIDD; Walter H. Lacey, Title Insurance and Trust Co., ARMA; C. H. Thompson, Oklahoma State University, AIDD; W. H. Topham, Pacific Telephone & Telegraph Co., ARMA; Dale S. Keubler, Photo Devices, ARMA executive vice president; Carl G. Sedan, SRE executive vice president. □



BEFORE THE USE OF the layout master, the layout man laid on the crepe masking tape to form not only the circuitry but also the physical outline and the terminal tabs. By working on a light table, he was able to establish good registration for two-sided cards by inverting the first side layout and placing the second on top. The base material is matte Mylar. This method was subject to dimensional inconsistency.

It's An Art At Lincoln

Lincoln Lab's Photo Service has refined the photographic aspects of printed wiring production to a new degree.



LAYOUT MAN ROBERT BURNS. The layout master uses sensitized Mylar on which the positive photograph of the terminal tabs and physical outline are established with great care. Such masters were duplicated and supplied in quantity to the layout man, who then concerned himself with only the circuit layout. Any redundant features of a layout can be handled in this manner. The result is high dimensional consistency, lowered layout time and excellent registration. The cost of supplying two masters for every card was high.

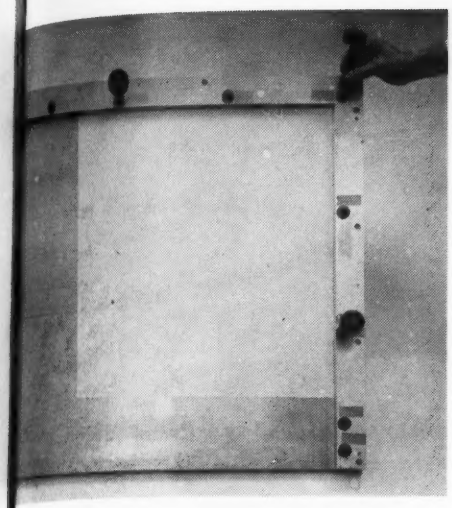
Last month's issue of INDUSTRIAL PHOTOGRAPHY was devoted almost entirely to photography at the Massachusetts Institute of Technology. Yet so vast is the subject that we were able only to sample it. Alone each of several of M.I.T.'s divisions could "fill a book."

Although education is its prime function, M.I.T. conducts original research in more than 70 laboratories.

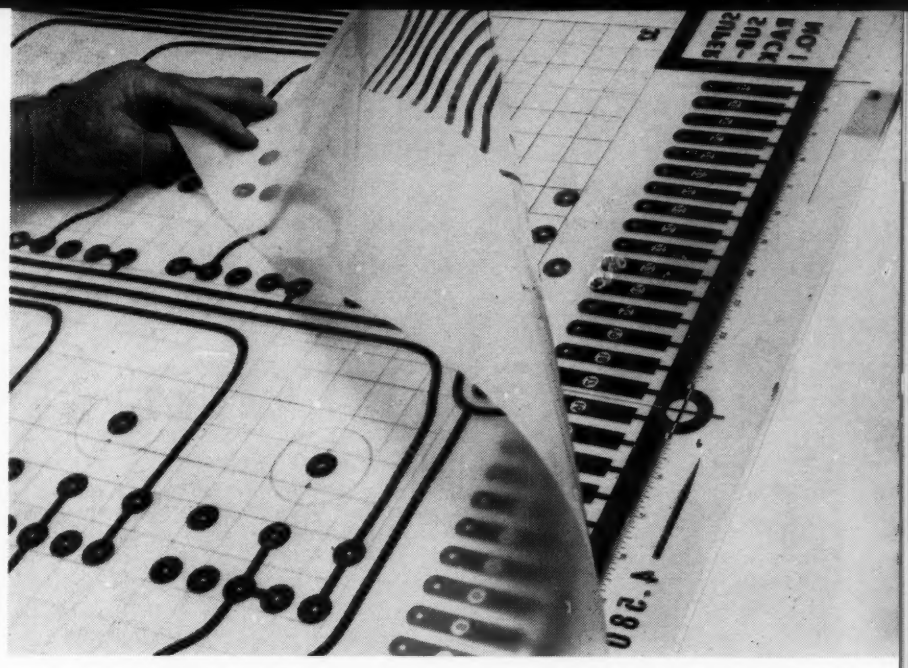
The largest of M.I.T.'s laboratories is the Lincoln Laboratory in Lexington, Mass. There M.I.T. conducts advanced electronics research with special attention to national defense applications, and it is there that an M.I.T. photographic setup most approximates that in industry.

Lincoln's Photo Service is a Group within the Engineering Division. The Group, headed by Henry Lane, supports Lincoln research with a complete still, motion picture and visual aids service. It is simpler to catalog what it *doesn't* do than what it does. It *doesn't* handle oscilloscope photography. That is the responsibility of the Instrumentation Room.

Photo Service, however, does emphasize certain techniques because of the very special nature of Lincoln's work. Take the case



THIS JIG PUNCH SERVES to establish registration pin holes in the layout master and in sheets of clear Mylar (unsensitized) of the cheapest grade. Note several sets of punch positions to accommodate the several established layout sizes.



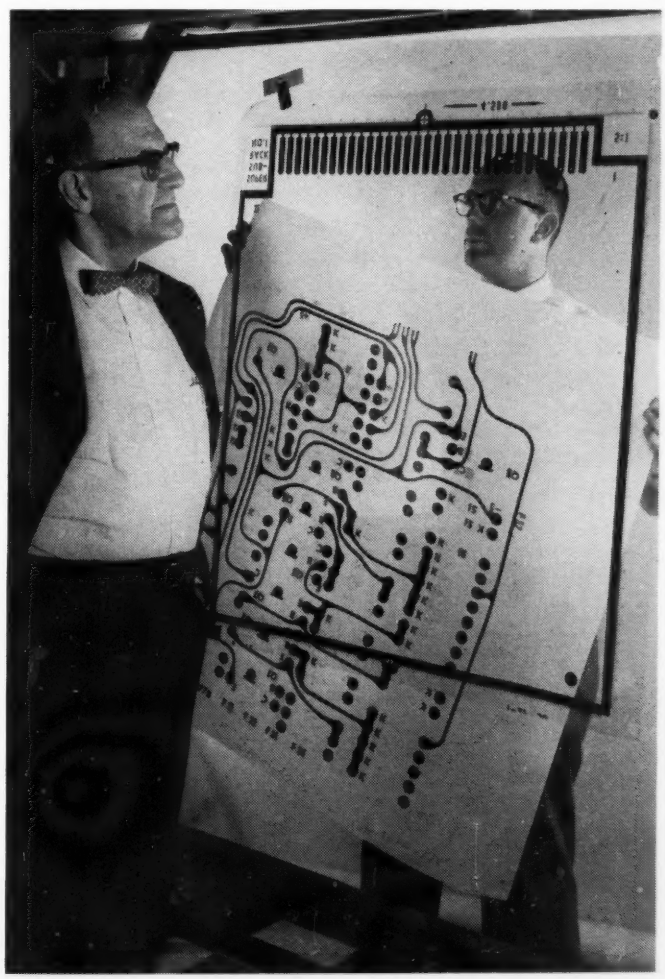
BY INDEXING A PLAIN sheet of matte Mylar with a master, the layout man may strip in only the circuitry. He uses this same master over and over. This is what insures consistent accuracy. Only the circuitry sheets are delivered to the photographer. The grid and the tab numbers appear only on the layout man's copy of the master. These aid the layout man.

of printed wiring, for example. requirements for printed wiring

Through the years, Lincoln's have increased. The part played by the photographer in the production of printed wiring cards is to make the transparencies by photo reduction of the circuit layout. This applies equally to Kodak K.P.R. techniques and to silk screen methods.

Modern methods of packaging electronics require that the finished card meet rigid dimensional tolerances and that all terminal tabs mate precisely with the terminal hardware. This imposes considerable responsibility on both the layout man and the photographer. As the package grows smaller, these problems become magnified.

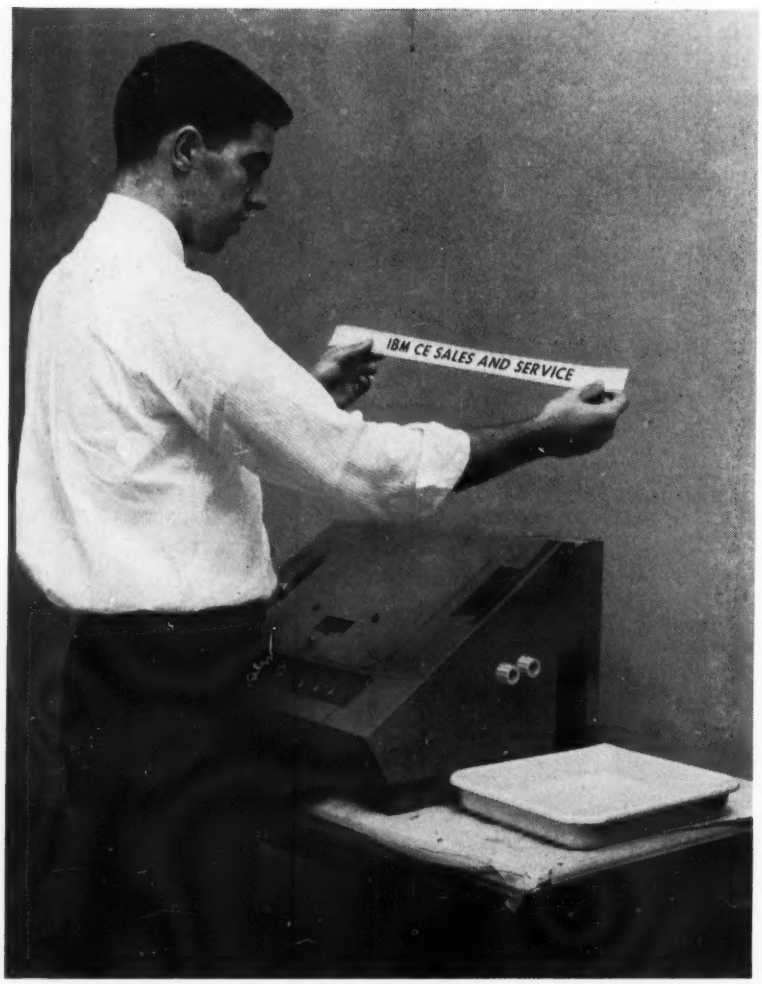
The accompanying photographs illustrate the steps that evolved a layout master technique that achieves dimensional consistency and precise registration for two-sided cards. It minimizes layout time and layout materiel costs. It is worthwhile for even limited run production. Most of the credit for developing this technique belongs to Earl M. Savage of Lincoln's Photo Service, a man who truly is one of the trailblazers of printed wiring photography. □



EARL SAVAGE (LEFT) AND PAUL CONNOLLY. The photographer uses his duplicate indexed master with the circuitry of first one side and then the other of the circuit layout. The photo reductions are made in this camera by back lighting the indexed sheets. For any given layout matrix only a very limited number of photographed layout masters is ever required, one for the photographer and one for each layout man. The result is consistent dimensional accuracy, excellent registration and greatly lowered material costs.

Just Around the Corner From the President's Office

On a New York City side street in a brownstone is housed the unit which fills all reproduction needs for the vast IBM corporate headquarters operation.



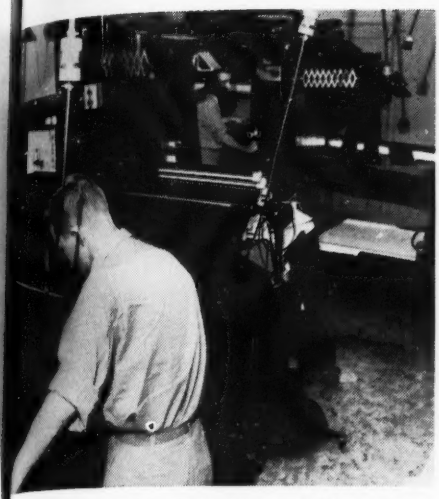
VINCENT PAPALEO of the Graphic Arts staff operates Varityper Headliner which produces type on transparent or translucent strips for offset. There is much exchange between the two units. For example, repro men make Xerox Vu-graphs for presentations.

by JILL ENGLISH

Corporate headquarters of the International Business Machines Corporation is located in a smart 20-story office building along New York City's Madison Avenue. Tunnels connect the skyscraper with the company's reproduction department, housed in the top three stories of a six-story reconverted mansion around the corner on a side street. The myriad multiple-copy needs of corporate headquarters — or CHQ, as it is abbreviated — are filled expertly and expeditiously by Reproduction Services.

When Manager Charles D. Bolline came to IBM in 1950 his department consisted solely of an Ozalid diazo machine plus Photostat equipment. Repro's main function was to serve the financial section of the company by duplicating bulky accounting reports.

Concurrent with Mr. Bolline's arrival, IBM followed many other companies and began enlarging facilities to include offset equipment. Today Reproduction Services employs 20 people so that most internal reproduction needs are produced, packaged and sent out from that one department.



XEROX AND ROBERTSON CAMERAS plus vacuum frame adjoin offset press area. At work here are J. C. Knudsen (L) and C. A. Manning in the background.

W. C. BIRKEL operates the Bruning diazo machine which is used for preparing copies of good quality where a translucent master is already available. This duplication technique is especially useful for long runs. Photostat prints are also processed, washed, dried and trimmed in this same department.

Most of the staff had some experience in fields allied to their present work before entering the department.

Department Layout

On the fourth floor the front room houses Mr. Bolline's office. In back of that is a section for the 914 Haloid Xerox machine from which both masters and white bond duplicate copies are prepared. The Photostat department, supervised by C. F. Nichols and staffed by three operators, is adjacent. Both operations are used for general duplicating of correspondence.

In the rear room is the Bruning diazo equipment and the area where Photostat prints are processed, washed, dried and trimmed. The Bruning is used for preparing copies of good quality where a translucent master is already available. This duplication technique is especially good for long runs.

Walking up a narrow flight of stairs to the fifth floor one enters the offset department. In the front room three Addressograph-Multigraph 1250 machines and one A.B. Dick 350 are kept rolling seven hours a day.

Convenient to the machines is the plate-making area. Here equipment consists of one Haloid Xerox No. 4 camera plus processor and fuser units in addition to a Robertson 17 camera. A vacuum frame completes the ensemble.

For added flexibility the Robertson has been modified so that it can make both Xerox masters and shoot film negatives. Even more unusual is that the No. 4 camera is used to expose film in addition to the Xerox plates. Exposures for both are about the same.

Supervisor T. F. Gallagher finds that using the latest in presensitized paper and metal plates saves time in the long run and produces higher quality work. For runs of 2,000 to 5,000 Enco paper plates or Polychrome 2-sided plates — both presensitized — are usually used. Polychrome's direct image paper plates are also used, with Addressograph-Multigraph paper plates for the Xerox process.

On the top floor two girls who perform reproduction typing assignments are closeted in a sunny room with an array of IBM Executive typewriters, each with a different type face. Type styles are selected by Miss Elizabeth Schutz who passes out assignments to her assistants.

At the rear on this floor is T. J. Guinn's bailiwick. Here are housed a Cheshire mailing machine and Addressograph facilities for envelopes, labels and general letters. *Think* magazine and other internal publications are sent out from here.

What material does repro turn out? Mr. Bolline sums it up by saying, "anything they want printed we'll print for them." "Anything" includes board of directors reports, management instructions, bulletin board notices, general duplication of reports and letters to the field organizations, preparing Photostat reductions and blow-ups, and Xerox Vu-Graphs of linework for executive presentations. "You name it," says Bolline, "and we probably have done it."

One more job can be added to the long list of duties performed by the Repro Section: James Dunne of the department services and conducts workshops on how to operate the various types of on-the-spot photocopy machines sprinkled through CHQ. □

Figure 1

Figure 2

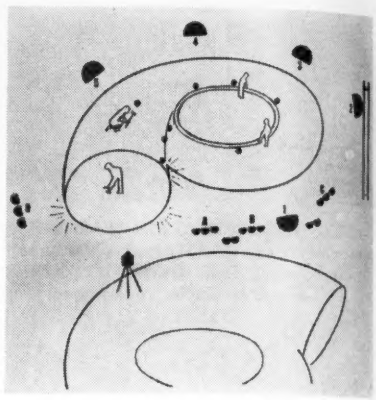


Figure 2a

HOW TO LIGHT

by MICHAEL D. DURANTE
Allis-Chalmers Mfg. Co.

Having to light large pieces of machinery located in various parts of a plant is a problem many company photographers have to face regularly. Our experience has been that it's a matter of carefully selecting and using some basic equipment.

Allis-Chalmers photographers roam our 160-acre plant in a motorized cart, carrying the equipment shown in *Figure 1*. This equipment includes 52 lights and 2500 feet of wiring. The cine-lights shown have sockets for seven No. 3 flashbulbs. Included also are two 20-foot light stands and 20 11-foot light stands. Graflex extension lights are usually used individually but may be hooked up in twos or threes if necessary. Slave units that fire either the standard base bulbs or peanut bulbs are used where lighting connection wires would show in the picture.

To fire up to eight lights, a five-cell battery flash unit is used. For larger setups — up to 20 lights — a 450-volt unit sets them off. Where more than 50 bulbs light up an area, firing is done from a special switch box equipped with a fast burning fuse in a 110-volt system.

The real question, however, is: Where do you put the lights? Areas of darkness, shadows and size of equipment to be photographed can make solutions to lighting problems difficult. The industrial photographer cannot limit himself to a basic lighting system of one key light, a fill-in light and a back light. The idea is to get enough light into a big area, and that is best accomplished through group lighting. Group lighting was used in photographing a large hydraulic pump-turbine scroll casing as shown in *Figure 2*. High point of the casing was 35 feet, and the distance from front to back measured 82 feet. The camera stood on an adjacent scroll casing, which was a little lower than the subject, and was placed to show off the opening of the huge casing. After the camera angle was decided upon, the task of setting up the lights began. *Figure 2a* shows the exact placement of most of the lights for this shot.

First, a cine-light (1) on a 20-foot stand was placed to the right of the camera over the casing, while a second cine-light (2) was clamped to one of the shop building columns 35 or 40 feet up and aimed down at the casing. Cine-lights 3, 4 and 5 on 11-foot light stands were placed around

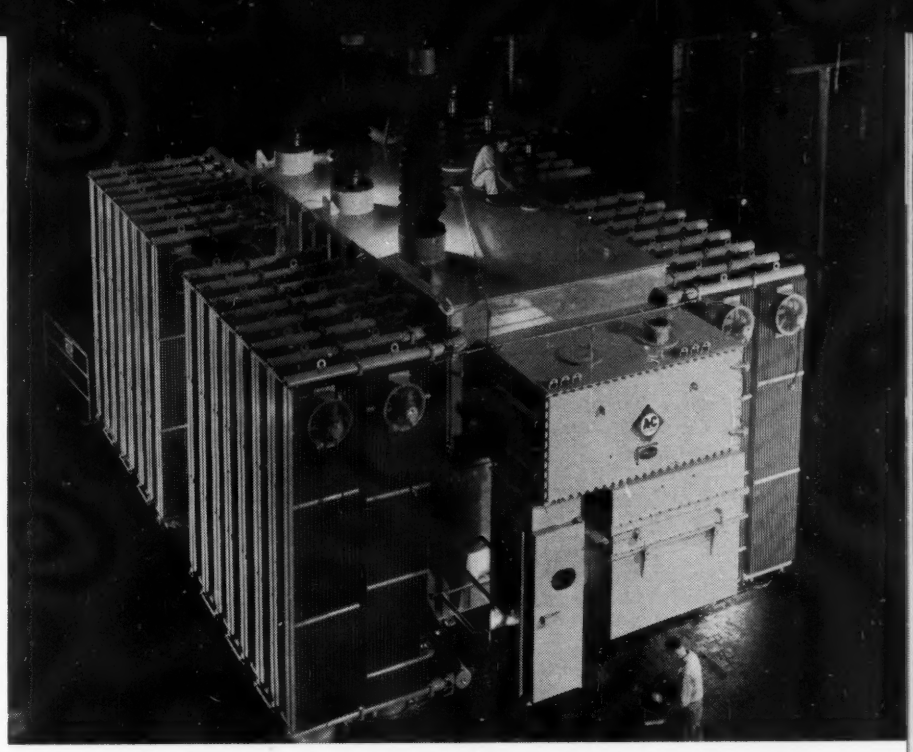


Figure 3

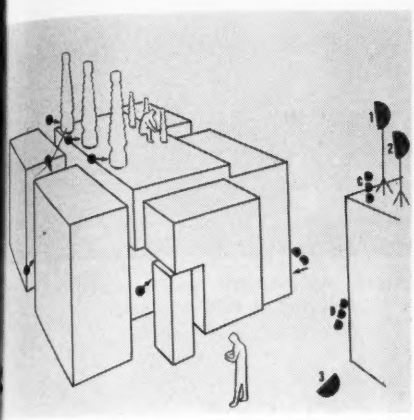


Figure 3a

GHTMONSTERS

the outside curve of the scroll casing and set to flash partly on the casing and partly up to cut away the smoke and haze that was in the background.

The Graflex three-light extensions were set up next. One (A) was put on the floor aimed at the casing. Another (B) was set about 10 feet above the first three-light extension while a third (C) was set approximately 11 feet high. With this arrangement, light was shining underneath the casing, two sets were on each side; and a battery of three lights (D) blanketed the extreme left side of the casing.

In addition to these, eight open bulbs were placed all around the ring. Inside the scroll casing shell were 18 lights to illuminate the huge opening. Every time a string of lights was put up, the photographer had to go back to the camera to see if any would shine or flash into the camera. This meant at least two dozen trips up and down a 35-foot ladder.

Approximately 1,000 feet of wiring was used for this picture. A special switch box equipped with a fast burning fuse to prevent blowing the company fuse was used in a 110-volt line.

All lights were set up in groups, in parallel and in polarity. Lights were grouped to offset the tremendous line loss. A group of three lights was set on one wire and the next group of three lights was brought in on another line, and the lights inside the casing brought in on still another line. They were hooked up into a master switchbox, so that if one line went dead, the others would work. By setting the lights up in groups, it is easy to determine which group did not fire. To ensure the same polarity throughout the circuit, plugs and receptacles were marked so that all ground wires went to the same side of each group of lights. If they are set in this same polarity all the way around, the lights can actually be counted as each goes off. It takes almost a second for the last one to fire. If in doubt about polarity of your wiring circuit, have the plant electrician check it over before proceeding.

Because of the many problems of lighting, guide numbers for exposure become important. Yet, guide numbers can only be used as a starting point to help determine exposure. In some shops where it is quite dark, guide numbers should be cut to one half or even to one quarter of the proposed number.

continued on page 85

SCHLIEREN EQUIPMENT with Polaroid back is readied by Wichers. Camera points at concave mirror of lighting set-up. "Ear-muffs" cut sound intensity from equipment under test.

TYPICAL ASSIGNMENT entails shooting whirly-bird at Palo Alto plant.

FOUR-BY-FIVE back is inserted into shop-built rig for Schlieren optical system in advanced research lab. Note Fairchild camera in set-up.

He seems to be in ten different places at once.

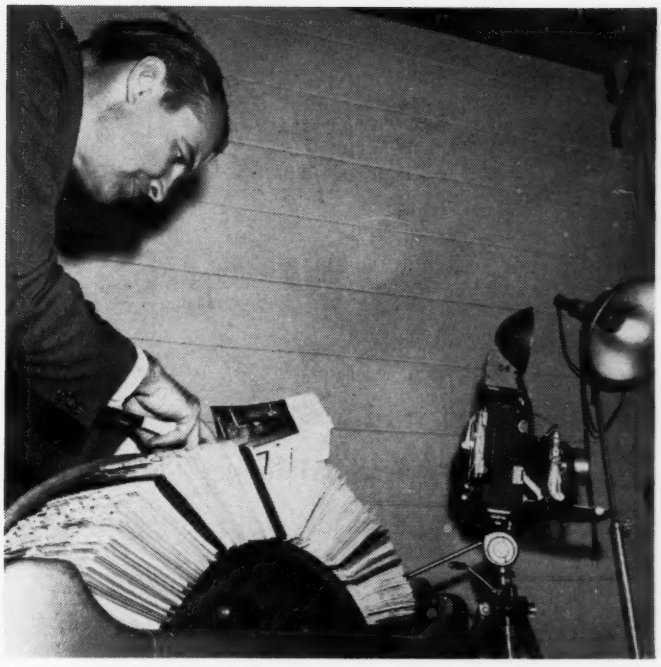
by **BERT GOLDRATH**

Henry Wichers of Hiller Aircraft Corp. in Palo Alto, California, is a one-man photo unit who manages to be in ten places at once covering ten different assignments. This feat is not pulled off by legerdemain, nor by splitting himself in ten parts, but by an indoctrination program where he has trained personnel in several departments to take over part of the photographic function. Where a photographic technique is standardized Wichers makes only the basic set-up and holds a brief instructional session. His assistant takes it from there. In a situation with multiple lighting he arranges the lights and places camera and subject so it is only a matter of his stand-in tripping the shutter.

Hiller researchers, engineers, artists, PR men and salesmen all require photographic services. This, understandably, calls for a variety of cameras.

Copy work is done by a Robertson 17-inch camera with Kodak Autoscreen and Kodalith

FIVE MINUTES after catching helicopter in motion Hiller is checking dot structure of halftone neg on light table.



MOST VALUABLE TOOL in the lab is a Cardineer wheel file which contains important prints on 5 x 7 cards taken during last ten years.

Omnipresent Mr. Wichers

films. For continuous tone work Gevaert Correctone does the trick.

Engineers in the field are loaned a single lens reflex or 35mm rangefinder model, while candids back at the main plant are taken with the Rolleiflex. In the studio a Burke and James 5 x 7 view camera does the honors, with flight service pilots being the chief users of Omega 120's. For publicity shots the Speed Graphic and an array of Polaroid backs and holders get the business.

Movie Equipment

Both 16mm movie cameras — a Cine Special and Bolex — are called on to shoot countless sales and promotion films plus annual reports to the military. Eastman #7255 High-Speed Ektachrome is the film workhorse.

For instrumentation, a high-speed Fairchild camera with two motors shoots advanced research projects at 7,000 fps. Recording instruments in flight is done with an Eyemo, sometimes implemented with five gun-sight aiming point cameras.

Because of the nature of Wichers' set-up he relies heavily on six different models of Polaroid Land cameras to help handle the workload. Where he formerly photographed new employees with a miniature camera, a department member now does the job, using a Polaroid with stereo attachment to get two identical pictures — one for his badge, the other to be filed.

A more complex application using this camera is found in the engineering test lab where it records the static destruction testing of transmission loads. During one or two days photos are taken of these stages right up to the breaking point which shows the fracture of metal.

In the advanced research section Polaroids picture disturbed air in a Schlieren optical system for jet engine investigation, checking air flow or exhaust on engine thrust. It is used with smoke and water table airfoil sections to determine how air moves around a component.

The technique calls for a Polaroid 4 x 5 sheet film holder in a ground glass back, using a 24-inch lens mounted on a heavy drill stand.

Once the camera zeros in on its tilting bed a Fairchild movie camera takes over, shooting up to 8,000 fps. The system is portable so it can be used indoors or out.

Wichers uses instant photography for graphic arts work when he wants angles of ships, parts and people. Shooting 4 x 5 sheet film and enlarging it 2X, he gets a full page illustration for Multilith reproduction. In this connection the pictures are used primarily for illustrating engineers' reports. The blow-up is made in the copy camera to the desired size on Xerox when an artist wants to hold halftones to use for sketching and reference. He need only lay vellum over the picture and copy it — thus saving countless hours for the artist.

With this big volume of work it's not surprising that Wichers and his darkroom assistant chalk up close to 4,000 negatives a year and about four times that many prints. □

Film Instead Of Notebooks

A little-publicized but highly successful program of twice-monthly week-long workshops to assist the industrial photographer is underway at the Eastman Kodak complex in Rochester, N. Y.

by MITCHELL BADLER
Editor

NORMAN E. SALMONS (right), manager of Eastman Kodak's Audio-Visual Services Department, lectures industrial photographers on the planning and production of inexpensive slide stories. His "students" are, from the left, Robert Vandercook (foreground), General Motors; Jack Kath (rear), Merck and Company; Elmer Bihl, Procter and Gamble, and Russell Einwater, Allis-Chalmers.

Just about one year ago a program of workshops was started to assist the industrial photographer. Sponsored by Eastman Kodak, the courses have been helpful to dozens of in-plant technicians although the program has not been widely publicized.

Twice monthly week-long workshops are held at Kodak's Professional and Technical Service Center in Rochester, N.Y. The emphasis is on new processes, new techniques and new uses for photography. Attendance is limited to six participants at a workshop to maintain a "roundtable approach."

Demonstrations and do-it-yourself camera room work take up 45 of the 50 hours during the five day week a visiting industrial photographer spends with Kodak. The schedule is a flexible one and includes:

Roll film versus cut film. Students examine the advantages and disadvantages of each type of equipment and discuss the materials, themselves.

Roll film workshop. A project is outlined, set up and photographed to create a "learn-by doing" atmosphere on the finer points of roll film photography.

The 4 x 5 in industry. This is a complete review of view cameras, again presented by means of a do-it-yourself project.

How to photograph company executives. Special sessions on all-important company portrait procedures.

Motion Picture Production. Low budget, in-plant films are the subject. A project is carried through on paper from initial plan to finished production.

Slide making. Production shortcuts for the creation of inexpensive slide stories are demonstrated.

Papers for industrial photography. Printing room sessions are devoted to techniques for getting the best black and white prints.

Making Ektacolor Prints. Simple methods for using Kodak's color negative system are demonstrated and tried by students.

The remainder of the visiting industrial photographer's week, four to five hours, is spent in informal "bull sessions" where students discuss common problems with each other. Out of these sessions have come time and money saving ideas for many companies.

Proof of the value of the get-togethers is the reaction of the photographers who have travelled to Rochester to attend.

"It took me a week to recover from the effects of being bombarded with so much advanced tech-

GEORGE AMBRESTER (left) gives tips on executive portraiture procedures to workshopers. Such sessions for industrial photographers are held at Kodak's Professional and Technical Service Center in Rochester.

DICK BURKHART (right) explains the Curtis Color Analyzer to a visiting in-planter who has been working with ROP separation positives. Together they will examine a set of positives for exposure and color balance. The center's emphasis is on new processes, new techniques and new uses for photography.

nical know-how and new ideas," says Bill Lucas, plant photographer for the American Optical Company. "That week is one I shall profit from for years to come."

The workshops have also proven valuable to industrial photographers in another way — they point up the professional stature of the industry to the photographer's boss and, inescapably, the photographer's professional stature. Here is a comment from a New England Utility's vice-president. "We think our photo chief is tops in industrial photography . . . but we are always grateful when there is an opportunity for any employee to learn more about his profession."

Outgrowth Of Older Programs

The industrial workshops are an outgrowth of Kodak's longer established information programs for professional photographers. It was started because of the peculiar difficulties that confront the non-specialist industrial man who must be public relations photographer, advertising photographer, movie man, photomicrographic specialist, slide maker and many more. In their week, the visiting industrial photographers get a taste of each of these areas (see photos). They work in studios that bring green to most photographers' eyes: four separate negative processing rooms, two completely equipped portrait studios with sliding doors to isolate work areas, an illustrative camera room, three black and white printing rooms, a negative retouching area and three color printing rooms. Equipment used sounds like an industrial catalog.

How does an interested industrial photographer attend? Arrangements are made through local technical representatives with no regional restrictions. It's a free school that benefits the entire industry.

ELMER BIHL (left) of Procter and Gamble and Jack Kath of Merck and Company just before a seminar session. Bihl is checking out a 35mm Retina Reflex. Kodak supplies each workshoper with a camera for the duration of the five-day term. They use them as "notebooks", to record high points.

IP 12/61

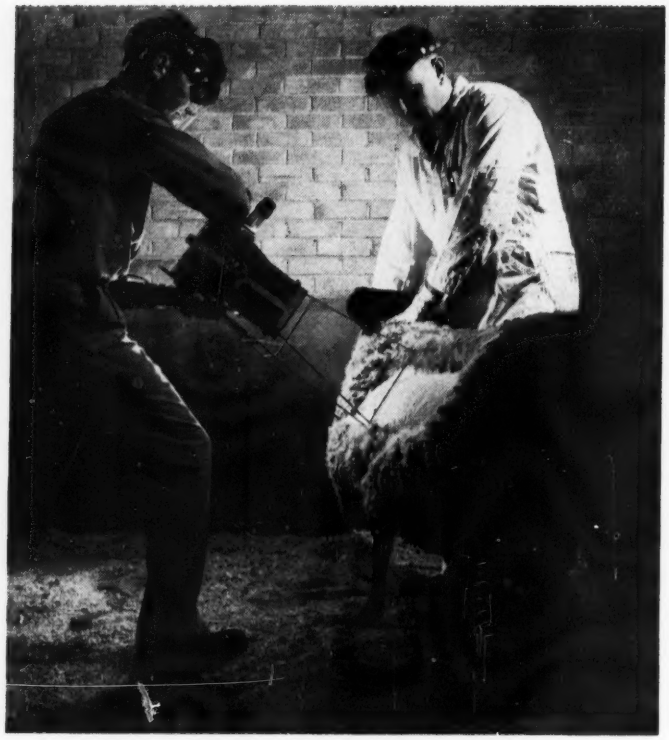
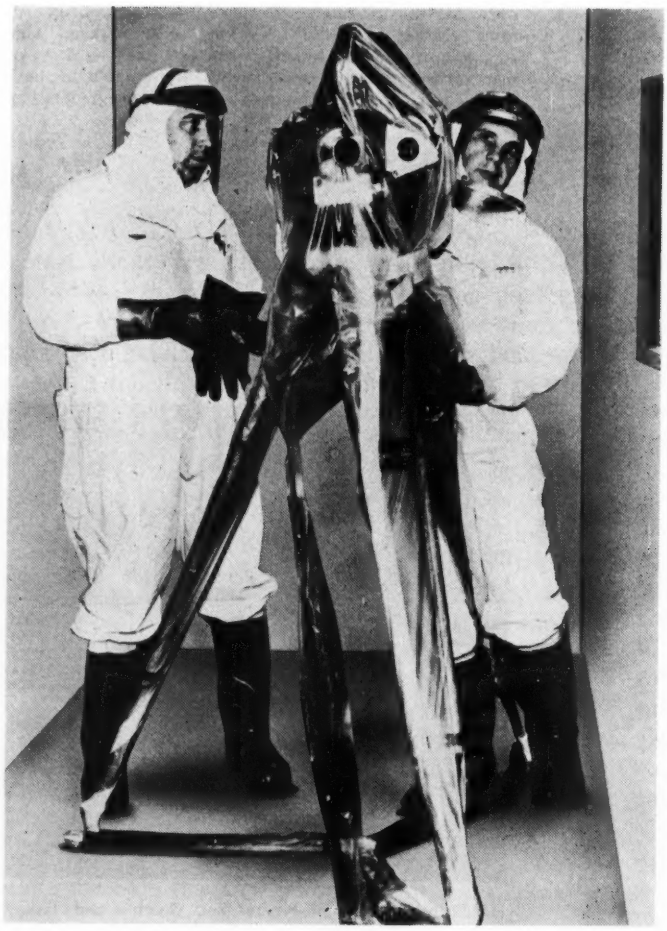


PHOTO RECORD of a test-irradiated sheep is shown being made. The wire camera positioner doubles as a "titler."

The Atom Challenges Photographers' Ingenuity At Hanford



SHEETS OF PLASTIC are used in radioactively contaminated areas to isolate men and equipment from possible contact with airborne radioactive particles. Such shrouding of photographic equipment can severely complicate even routine assignments.

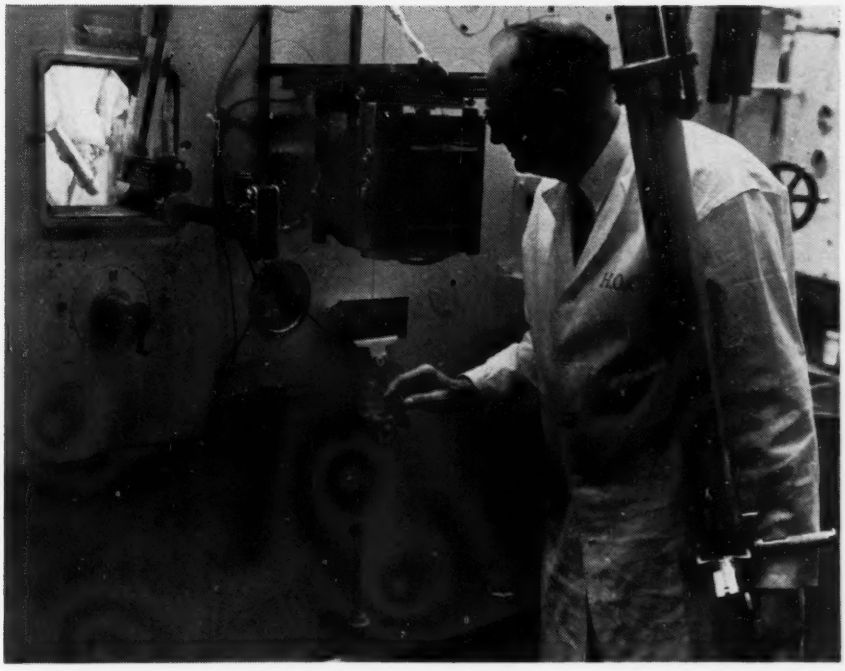
by J. E. BROWN
Hanford Laboratories
General Electric Co.

On a 600-square-mile expanse of semi-arid desert in south-central Washington State is Hanford, the vast nucleonics reservation operated by the General Electric Company for the Atomic Energy Commission. A 14-man photo-lab staff is indispensable to its operation.

Shuttermen at Hanford rarely enjoy the luxury of studio photography. They must travel by auto to a dozen or so separate production and research locations — some of which are separated by as much as 30 miles — on a government reservation almost as large as the state of Rhode Island. "On the run," they must be prepared to tackle almost every conceivable photographic specialty: general industrial, construction, portrait, news, semi-scientific, medical, aerial and motion picture.

The camera most basic in the Photography Operation's routine is the 4 x 5 Linhof equipped with

ELAPSED TIME CAMERA aimed at control panel exposes one frame every eight seconds. When run through a projector at normal speed, the movement of dials, imperceptible to the human eye, are speeded up.



BOTH VIEW AND 35mm cameras are used for macrophotography of radioactive specimens in Hanford's radiometallurgy laboratory. Mounted on the outside of heavily shielded multicurie "cells," these cameras shoot through windows and ports of optically corrected lead glass.

interchangeable lenses. Electronic flash with extension is the lighting standby. Other much-used equipment includes such studio and copy tools as an 8 x 10 Deardorff with a Hinelight and an 8 x 10 Linhof view camera. Workhorses in the 35mm line include Leicas, Alpas, Exaktas and Retinas. Rolleis and Speed Graphics also come in for much duty.

Examples of special service equipment include a Graflex with a 14-inch lens, a K-20 aerial camera converted for use with cutfilm holders, a remotely operated Robot with electronic flash, a small press camera adapted for use with an underwater periscope and two "slit" cameras.

Motion picture work is done on 16mm film in these cameras: a Maurer, Kodak Highspeed, Cine Special or one of six Bell & Howells. For high-speed work, a Fastax (Model WF 2) with strobe is used. Most footage is shot on Tri-X reversal film and is processed in the Operation's Houston Fearless K-14 processor.

Beseler, Omega and Saltzman 4 x 5 enlargers and an Elwood 8 x 10 unit serve the Operation's enlarging needs. A roll printing and processing unit handles the large volume of 8½ x 11 prints for technical reports.

Radiation-safety practices influence the working routines of photographers at Hanford. It is not uncommon for a photographer about to work in contaminated areas to be required to suit-up in two or three pairs of coveralls, shoe covers, leggings or rubbers, a skullcap, hood, assault mask and several pairs of gloves! Looking through viewfinders, delicate adjusting of shutters and working in tight places gets tricky with all that apparel. In addition, time limitations within some extra "hot" zones require fast and efficient shooting. When these time restrictions get really tight, several dress rehearsals must be held before actual shooting.

Contamination is not only troublesome to the routine of the photographer, it threatens his equipment as well. If a camera, tripod, flashgun, etc., pick up much contamination, they are buried. When several hundred dollars in equipment are involved, this threat is worrisome. Photo equipment must always be carefully wrapped with sheets of plastic or some other type of radiation-safe container or kept at a safe distance.

Atomic radiation does not normally fog films used in industrial photography. Exposures safe for man are safe for film. However, there are some instances of film fogging when shots of long duration are made remotely.

Photographic lighting difficulties are probably wrestled with more often at Hanford than at most non-nuclear sites. Cameras must peek into cubicles, "caves," "cells," "canyons," underwater pools, reactor-tube channels and many more kinds of contained spaces.

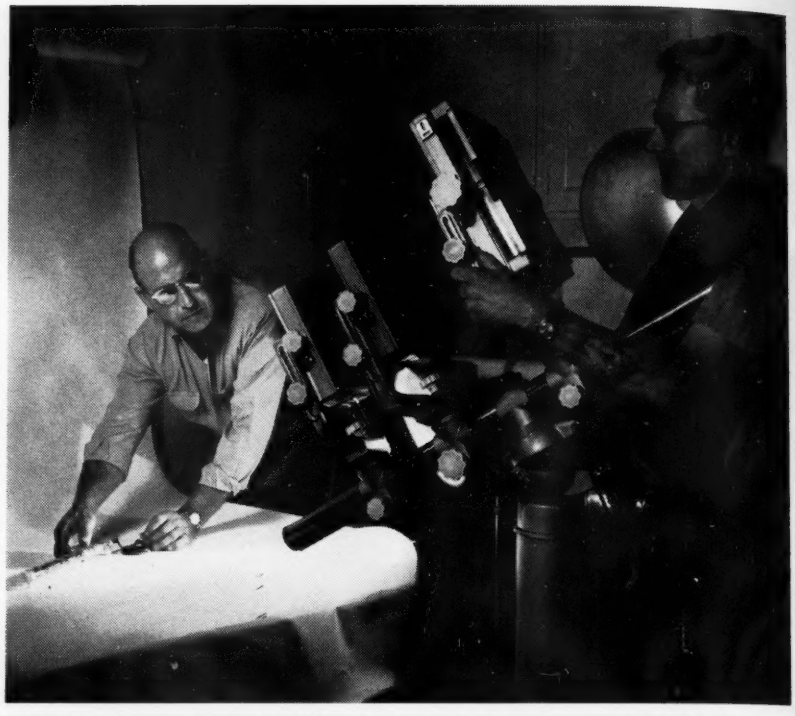
In radiometallography of radioactive specimens, for example, lighting can become a problem. Ponderous walls of 18-inch-thick Meehanite cast iron and

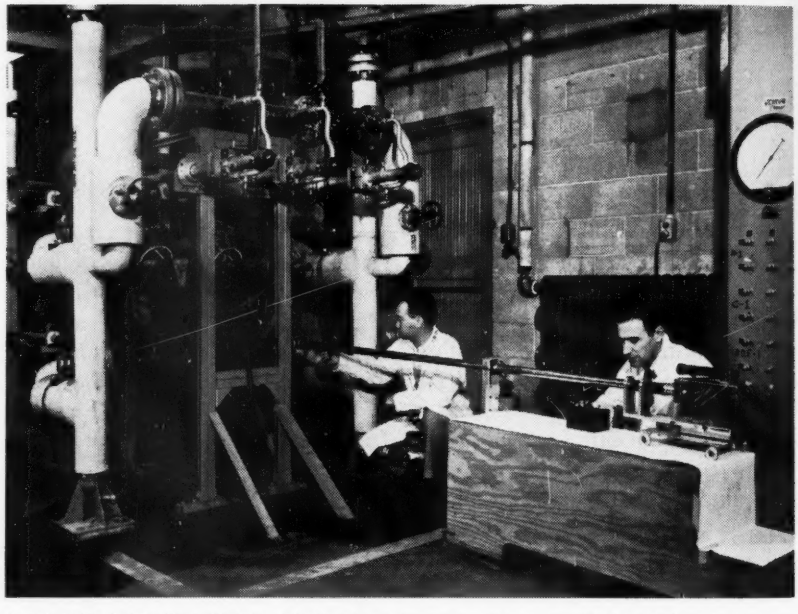
lead-glass windows often separate the photographer from the "hot" samples which are to be photographed. Employment of carbon-arc light sources in such situations illustrates photo ingenuity.

Light from carbon arcs on the outside of the cast iron wall is relayed through lenses and focused on the specimen by microscope objectives. Light reflected from the specimen is then passed back through the objective lens, the microscope lenses, the relay lenses and thence to the film.

Reflection of light from arcs was also used in a recent request to closely examine an arc welding phenomenon with a high-speed (2,000 fps) motion picture camera. Lighting of the metal being welded while also holding photographic detail of the welding arc was the test of ingenuity. The problem was solved by using parabolic mirrors to reflect the welding arc's light back to the metal. Another arc was struck first to record the starting period of the "subject."

Occasionally, professional photographers from Hanford's photo lab are called in to assist in research applications of photography, but normally the scientists fend for themselves in the strictly research photo routines. Actually, much of the research photography is just straightforward use of films and processing. It's the objects they are looking at that most interest them, not the photo tools and techniques. Objects of photo research probably most looked at are radioactive metals under various conditions of temperature, stress and strain.





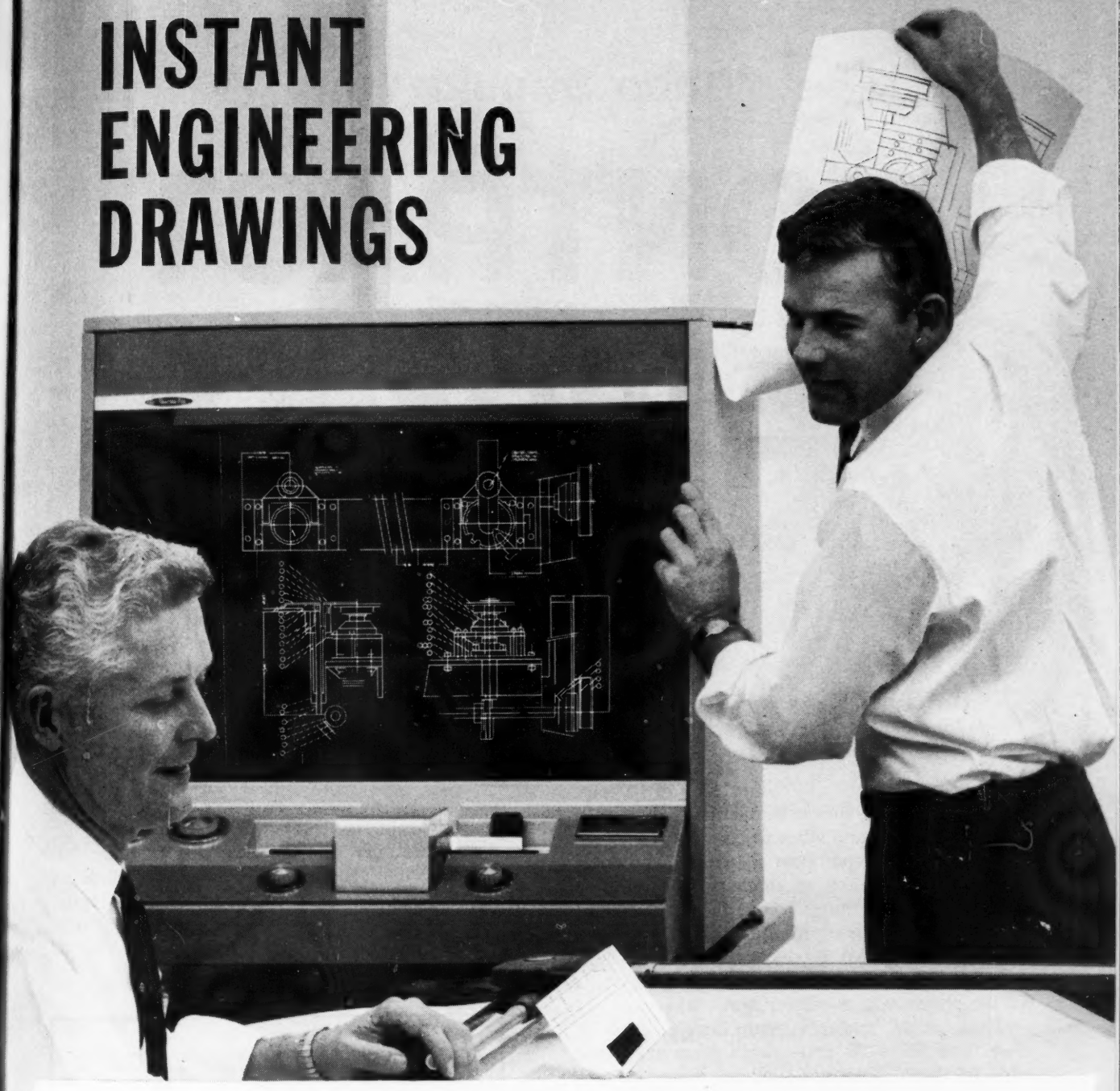
VIEW CAMERAS AND MOVIE CAMERAS. They are only two of the kinds of cameras used at Hanford. TOP: An equipment shot is made for an R&D report. BOTTOM: A motion picture camera equipped with an extremely wide-angle lens and a prism-equipped tube to carry light from the lens to the camera is used to film the inside of reactor tubes.

Eye-Catchers

There are some things, however, in the scientists' bag of photo tricks which do catch the eye of the industrial photographer even though they do not necessarily fall within his normal photo sphere. Included are science photography's applications of monochromatic light, polarized lighting created through complex prism systems, specialized carbon-arcs for full spectrum illumination, etc.

But in high-magnification applications, industrial and scientific photography at Hanford do part comupany. In electron microscopy, for example, films are exposed by electrons, not visible light! At Hanford, normal magnification working ranges are ¼ to 30X for macrophotography, 25X to 2000X for microphotography in metallography, and 5000X to 20,000X for electron microscopy. Radiations complicate magnification work all along the line. Highly specialized preparation of non-radioactive replicas of radioactive samples for electron microscopy and cathodic etching of samples by ion bombardment are procedures which typify the complexities of this area of scientific photography. Incidentally, the use of polarized light is involved in uranium sample preparation problems for microphotography. Uranium grain structures are almost impossible to etch for good in normal "bright-field" illumination. □

INSTANT ENGINEERING DRAWINGS



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. . . WHERE RESEARCH IS THE KEY TO TOMORROW

When Should You

CONTRACT SERVICES

do outside services help or hurt?

by WALTER BENSON
Chief Photographer
Olmstead Air Force Base

Besides personnel and money, one of the biggest problems an industrial lab chief has is in deciding whether and when to contract for any of the services his department is asked to produce. Before he can make an intelligent decision he must know three things: first, the real costs of every phase of his operation; second, he must have an established production standard; third, he must have an accurate inventory of the skills of the people who work for him.

Most photo managers immediately know if they have the skills and talents necessary available to them. Two areas where information is not as accessible or organized is in cost and production standards.

Talking about costs means realistic figures. You cannot get a true cost by adding the dime a piece of paper costs to the labor cost of 20 seconds to expose a print to the 120 seconds to develop that print to the minute of labor in the processing room to the ten minutes of drying and packing labor. These are the costs you see but they are only a small part of your overall cost picture. It is the unseen costs such as light, heat, rent, administrative salaries, vacation pay and fringe benefits that swell costs. To know exactly what the price of your unit of production is, you must set up a system of accounting and analysis. When this system is functioning you will also get a production standard as a bonus.

The system that you establish must give you the number of direct labor hours used to produce your work units. The number of works units produced in a given number of direct labor hours can become your production standard. Then by dividing the number of work units into the total cost of producing these units you will get a unit cost. Remember that the total cost of each type of production should include the cost of all direct labor hours, vacation pay, administrative costs, material costs and contractual services that may

continued on page 54

TOTAL DIRECT LABOR COSTS

TOTAL LABOR COST	$507.50	
TRAVEL	100.00	
LEAVE FACTOR COST	63.44	(12.5%)
SICK LEAVE	00.00	
	$670.94	

LEAVE FACTOR

TOTAL DAYS	365
LESS SATURDAYS & SUNDAYS	104
TOTAL WORK & VACATION DAYS	261
AVERAGE VACATION DAYS	20
AVERAGE HOLIDAY & OTHER LEAVE	9
AVERAGE YEARLY WORK DAYS	232

	AVERAGE DAYS ANNUALLY		AVERAGE WORK DAYS		ANNUAL RATE
VACATION LEAVE	20	÷	232	=	8.6%
HOLIDAY & OTHER	9	÷	232	=	3.9%
					12.5%

EXAMPLE

LEAVE FACTOR		DOLLAR VALUE DIRECT HOURS USED		LEAVE FACTOR COST
12.5%	X	$507.50	=	$63.44

BEFORE AN industrial photo lab chief can make an intelligent decision as to whether or not he should contract for any of the services his department is asked to produce, he must know the real costs of every phase of his operation. To determine these costs, he must set up a system of accounting and analysis.

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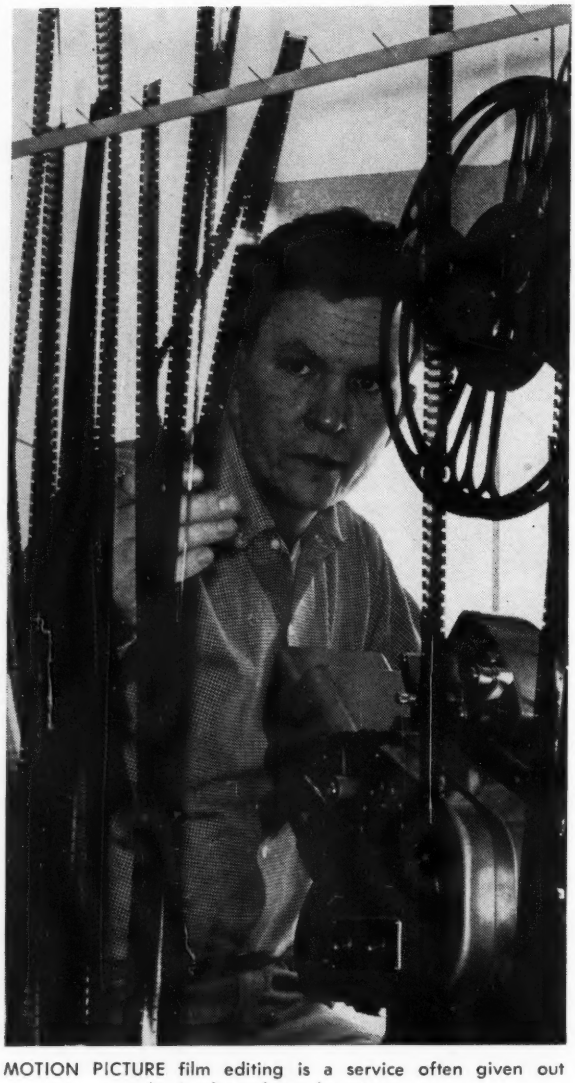


MOTION PICTURE film editing is a service often given out by in-plant photo departments.

contract services

continued from page 52

be required to produce these units.

Being a photo manager in many ways is similar to being a business man; early in the game you should establish a price for your products and services. Only in your case, as an in-plant operator, you neither want to make a profit or loss. After obtaining a cost per unit of production, you should see how close you came to the price you set. If you made a profit, perhaps your production standards are too low, meaning you can produce more and thus lower your cost. If you lost money, either your charge is too low or your production too low.

It is at this point that you must analyze your figures and arrive at the cost and production standards that will enable you to turn out the lowest cost-quality product. With this information as a base, you now have a measuring stick to use for comparison in deciding whether or not to contract a job or do it yourself.

Let's put this theory to work. You are managing a lab that must produce 200 8 x 10 black and white prints each work day to make the printing operation pay for itself. Along comes Jones, the public relations man, with a 200 8 x 10 color print order he needs in three days. Hours before, you committed your production schedule to producing 500 black-and-white prints in the next two-and-one-half days. By knowing your cost and production standards you can easily figure out the number of overtime hours you will need to produce the color prints or the black and whites and what each will cost you. By comparing your costs with the outside vendor's charge (assuming that quality will be comparable) you can sensibly and quickly make a decision to contract either job or do one on overtime.

Pride Leadeth To False Economy

Very often your pride as a craftsman lets you think you can do a job rather than contract for it. This can be false economy. To do a job right you need skill and equipment. If you are not fully stocked in either area, beware. Manpower is valuable — don't waste it trying to do a job you're not equipped for. For example, let's assume that you occasionally produce 16mm color movies for your company. A good area for contracting is in the editing of such productions. You probably can never do the editing in the way and time a professional editor can if you do it infrequently. Or take the case of 4 x 8′ murals. To produce such prints you will need special equipment and manhours just to set up. While you are getting ready you could be producing your normal quota of work units.

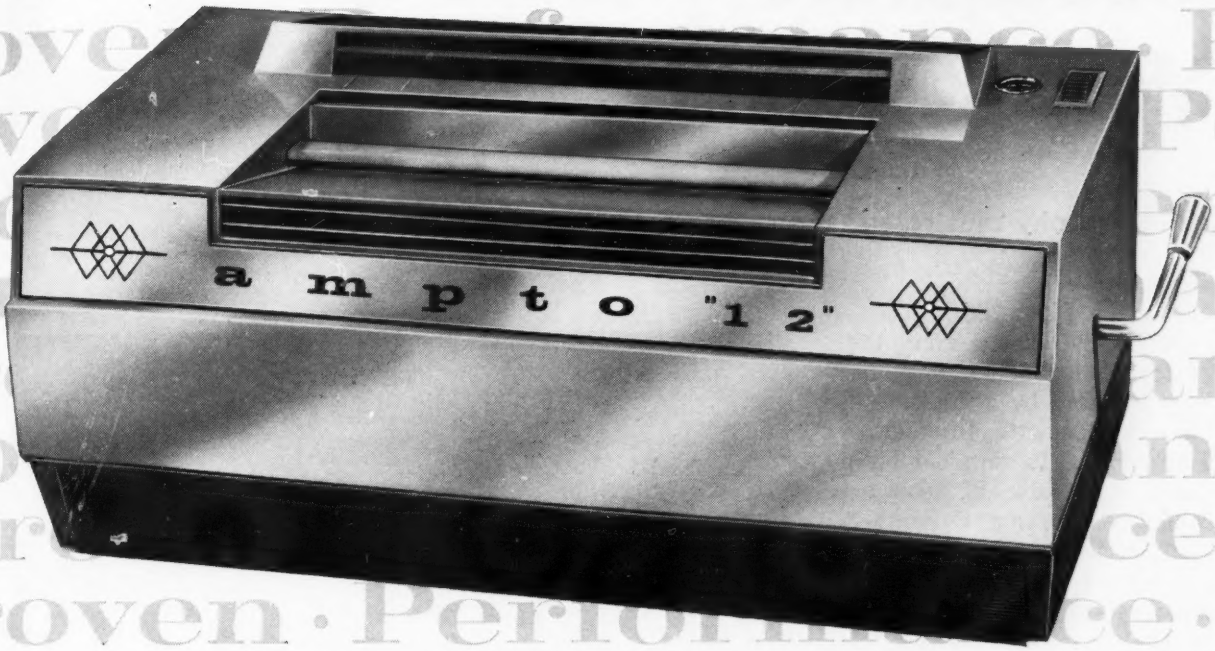
True, by doing these jobs you will be gaining experience but reserve these efforts until there are lulls in your work schedule. Then you can go through the learning process leisurely, correct any mistakes you might make, and still maintain some of your normal production schedule.

The Same Goes For Repairs

This also holds true for repair work. If you take the time out to repair a piece of machinery — assuming that you can — you may be charging yourself more than an outside repair service if you disrupt your normal production schedule.

The only way to make a sensible decision on contracting jobs and services is to view each situation separately. Ask yourself, "If I do this job myself, will it interfere with my normal production standards? Can I do a top quality job? Most important, can I do it as cheaply as I think I can and get it to the customer when he needs it?" Only a cost analysis system can help you determine the answers to these three questions quickly and the answers to these questions will spell out good photographic management. □

Proven · Performance



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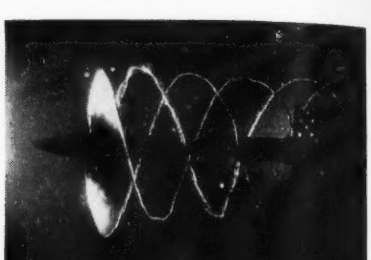


IN THE Propeller Cavitation Tunnel spiral vapor streams originate from the blade tips of a model propeller and cavities are formed on each blade in a study of cavitation effects. Studies such as this enable marine engineers to design more efficient propellers.

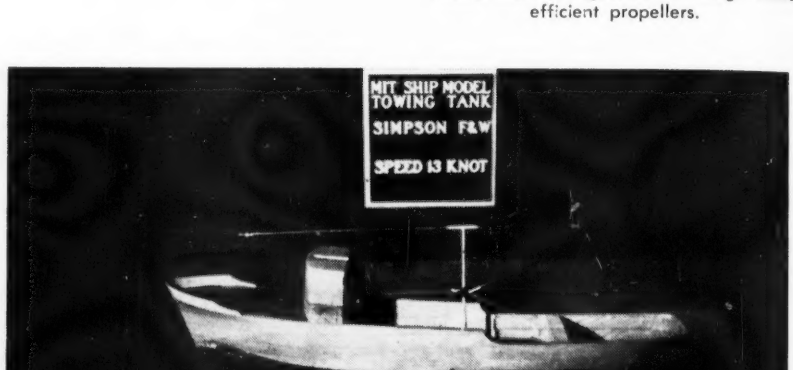
Since 1890 almost every ship of the United States Navy has been designed by a graduate of the Massachusetts Institute of Technology. To turn out naval architects capable of such accomplishments, the Department of Naval Architecture and Marine Engineering maintains three laboratories—the ship model towing tank, the propeller tunnel and the ship structures laboratory. All employ photography.

The *towing tank's* principle purpose is to make possible the prediction of the power requirements of a full-size ship from tests carried out on geometrically similar models. A 30-foot section of windows on the tank's outer side makes possible the taking of high-speed motion pictures from under the model's keel.

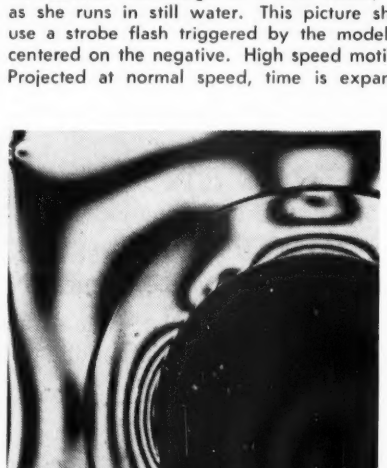
The *propeller tunnel* also uses models and cameras in helping marine engineers test various propeller designs and materials. The propeller models are mounted on a rotating shaft, and a stream of water is sent through the tunnel at whatever force is desired. It employs extensive use of strobe flash cavitation.

Principal purpose of the *ship structures laboratory* is the study of the stresses and strains imposed by the sea on such things as plate panels. Here again this lab researches phenomena which can be observed; and for that reason, these phenomena are photographed so that they can be studied at leisure.

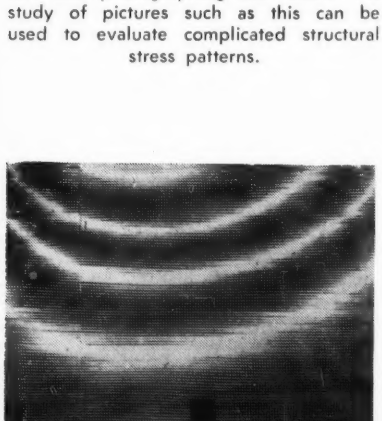
The work pictures and captions on this page best illustrate the functions of photography in this department. □



IN TESTING the design of a new vessel, it is valuable to know the bow wave profile as she runs in still water. This picture shows such a bow wave. It was necessary to use a strobe flash triggered by the model itself to obtain this resolution with the boat centered on the negative. High speed motion pictures were taken of the model in waves. Projected at normal speed, time is expanded so that ship motions are seen directly.



LEFT: A polariscope photograph of a reinforced circular hole in a deck plate under compression. The dark bands represent lines of constant change of stress. The closer the bands are to each other the more intense the stress. This picture was taken by passing polarized light through a Lucite model of the structure and photographing the result. The study of pictures such as this can be used to evaluate complicated structural stress patterns.



RIGHT: Distribution of stress in a flat plate under normal loading is studied by means of the Moire method. The picture was made by silvering the underside of the plate and supporting the plate by its edges above a lined surface. Deflection of the plate will result in a lined surface image being projected back onto the lined surface. The interference pattern resulting is photographed through the hole in the center of the plate. The light and dark bands are interpreted in the same manner as the polariscope lines.

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Brilliant Single-Source Colorhead with dial-densities from 0 to 199—and fade-resistant Type-C filters. Now all 4x5 Beseler owners can profit from the teamwork of two of the greatest names in photography—Beseler in America and Agfa in West Germany. Designed for American methods and materials, the new head provides fade-resistant Type-C filters in densities from 0 to 199 in all three subtractive colors—yellow, magenta, and cyan.

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New

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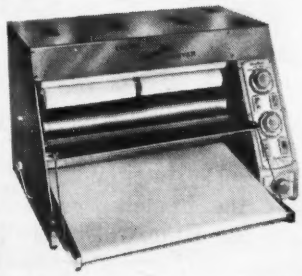

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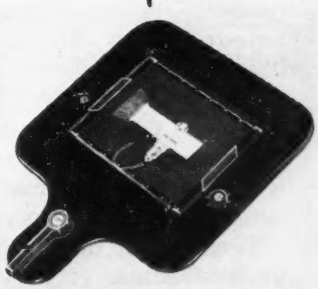

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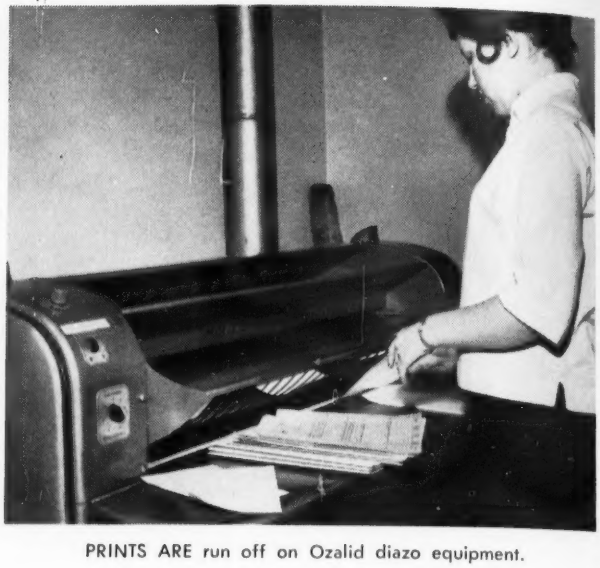
UNIT ASSEMBLY pack list is prepared on translucent original.



PRINTS ARE run off on Ozalid diazo equipment.

Half-Size Positives Mean Better Service

The man who invented decentralization might very well have had Lennox Industries in mind. Even if he didn't, it is quite clear that Lennox has had to keep the originator's percepts in mind to continue as the world's largest manufacturer of heating and air conditioning equipment.

Headquartered in Marshalltown, Iowa, Lennox has eight factories and branches all over the country. Despite geographic diversity, the nature of Lennox Industries' work calls for a high degree of technical centralization in the laboratories and drafting rooms of Marshalltown that must somehow be wedded to an equally high degree of manufacturing autonomy at branch plants.

Because of the engineering-oriented nature of its business, much of the traffic within and between plants is in the form of layout and detailed drawings, specifications and the accompanying instructions and correspondence. Added to this is general communication about purchasing, invoicing, inventory and other vital interoffice information.

To keep pace with this load, Lennox some years ago began switching to high-speed, dry-process diazo equipment that would shave a little off every penny expended for reproduction of drawings, instructions and other correspondence in the main office and branches. Starting at the main office, Lennox installed Ozalid diazo printers that have been in almost constant use ever since. Branch plants and offices also swung over to use of comparable Ozalid equipment, discarding the wet printers which had formerly been used. With this system, the initial advantage is that single intermediate copies (or duplicate originals) could be sent out from headquarters and the branch plants could quickly make as many clear, sharp prints as they needed.

One of the plant supervisors, William Stansberry, reports that perhaps the biggest saving since diazo was installed is that one operator can produce many more prints and have additional time left to take care of the literature department. This plant employs the equipment for printing packing lists, installation instructions and a long list of weekly, monthly and other periodic reports by its Accounting Department.

Primary use of the equipment in the laboratory is in making releases to all Lennox divisions when new products or changes in existing products are cleared for use in the field. These releases are in the form of diazo duplicate originals (or intermediates) which give the branches reproducible masters from which they can duplicate their own shop detail drawings fitted to the individual plant's production needs.

According to John Greiner of

continued on page 65

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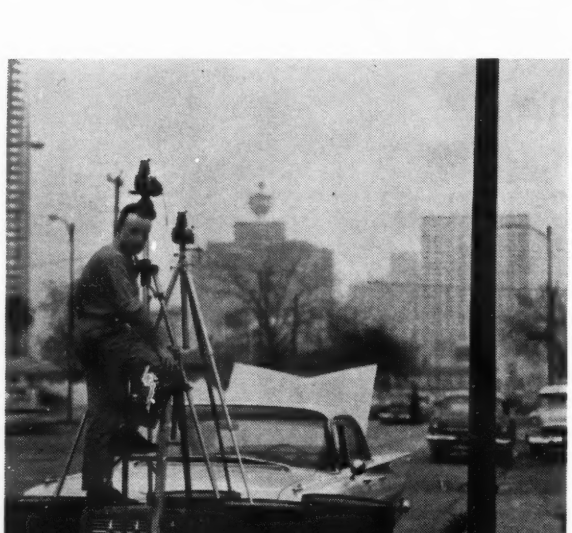
An Elevator-Eye View of America



A distinctive advertising angle profits from some distinctive photography.

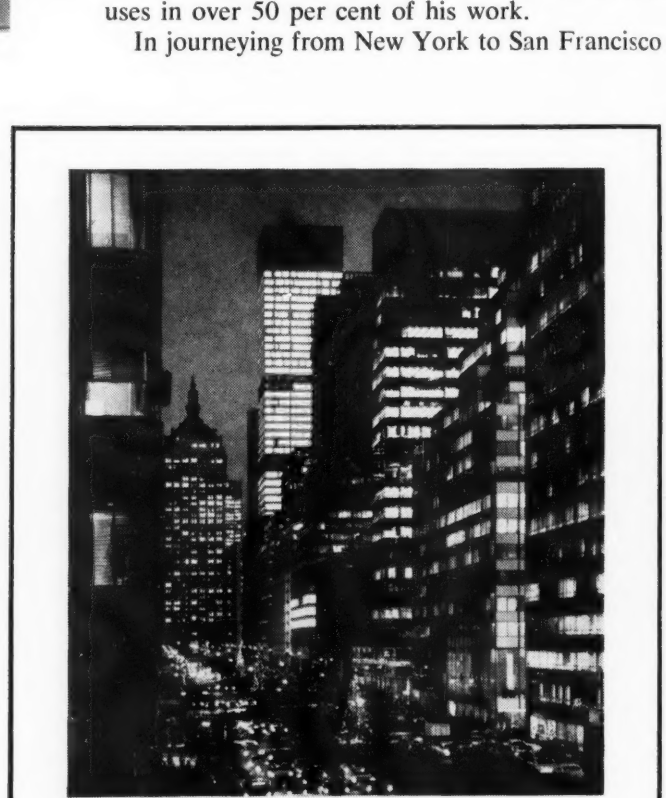
by PENNI KIMMEL
Editorial Assistant

The Otis Elevator Company posed a challenge for industrial photographer Herbert Loebel — how to illustrate the advertising theme: ". . . *traffic congestion either ends at curbside or extends into building lobbies — depending upon the kind of elevatoring used.*" The photographs were to be taken in various cities across the country. The rest was strictly up to the man behind the camera — in this case a Hasselblad 1000F which Loebel uses in over 50 per cent of his work.

In journeying from New York to San Francisco

TOP: Herbert Loebel on location with trusty Hasselblad. BOTTOM: Chicago results — 108mm Sonar, f/2.8 at 1/5 sec.

RIGHT: Park Avenue results in ad — 135mm Sonar, f/3.5 at 1/3 sec.


NEW YORK DISCOVERS that traffic congestion either ends at curbside or extends into building lobbies—*depending upon the kind of elevatoring used. Why? Because there is more to completely automatic elevatoring than simply leaving the operator out of the car!* Any elevator installation that fails to provide complete automation for all of the constantly changing, widely varying traffic patterns that occur throughout the day and night—*invites curtailed service, long waits and traffic congestion.* This applies in a like degree to the greatest skyscraper and the smallest commercial or institutional building. How do tenants and visitors react? After all, they are people. They react in a like manner to elevator service. And a building's reputation soon reflects their reactions. The mark of a CLASS "A" building—*large or small*—is completely automatic AUTOTRONIC® elevatoring. It accurately predicts and delivers a magnificent performance. Since 1950, more than 1,100 new and modernized buildings across the United States and Canada have contracted for AUTOTRONIC elevatoring by OTIS—the world's finest!
Park Avenue looking south from 57th Street
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Offices in 501 cities around the world
AUTOTRONIC® OS ATTENDANT-OPERATED PASSENGER ELEVATORS • ESCALATORS • TRAV-O-LATORS • FREIGHT ELEVATORS • DUMBWAITORS
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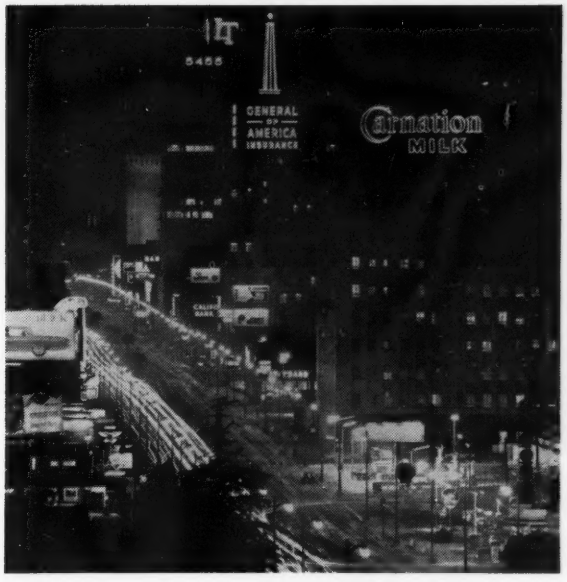
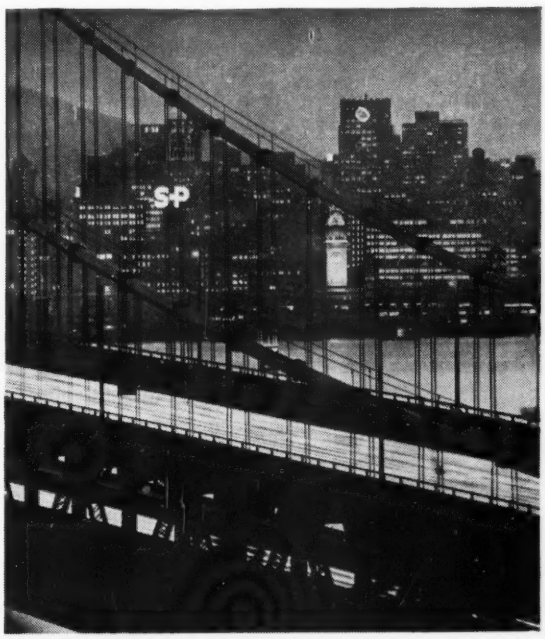


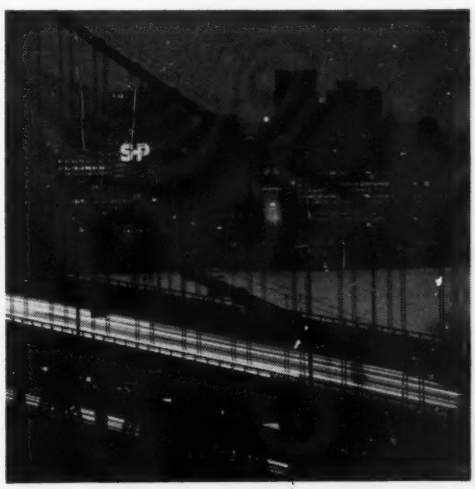
— by way of Philadelphia, Chicago, Houston and Los Angeles — he took the photos on these pages. They were created by a juxtapositional action between the vertical skyscrapers (masking the brisk elevators ascending and descending inside) and the flowing traffic in the streets. Utilizing his specialty, long lenses, he chose Nikkor and Sonnar lenses for this assignment.

An Engineering Graduate

Out of an engineering and art background (Loebel is an electrical engineering graduate of Vienna with experience in the fashion field) there arose a photographer especially suited for industrial work with an accurate eye for precise rendering of his subject and an artist's understanding of form, composition and color. He concentrates on definitive photographs which attest to the permanence and timelessness of industry rather than an "artistic" approach which he feels is based on temporary values. "I do not search," Mr. Loebel remarks positively, "I solve problems." □



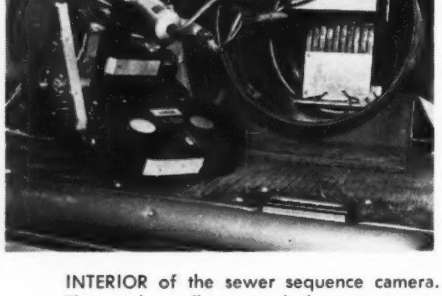
SAN FRANCISCO DISCOVERS that traffic congestion either ends at curbside or extends into building lobbies—*depending upon the kind of elevatoring used. Why? Because there is more to completely automatic elevatoring than simply leaving the operator out of the car!* Any elevator installation that fails to provide complete automation for all of the constantly changing, widely varying traffic patterns that occur throughout the day and night—*invites curtailed service, long waits and traffic congestion.* This applies in a like degree to the greatest skyscraper and the smallest commercial or institutional building. How do tenants and visitors react? After all, they are people. They react in a like manner to elevator service. And a building's reputation soon reflects their reactions. The mark of a CLASS "A" building—*large or small*—is completely automatic AUTOTRONIC® elevatoring. It accurately predicts and delivers a magnificent performance. Since 1950, more than 1,100 new and modernized buildings across the United States and Canada have contracted for AUTOTRONIC elevatoring by OTIS — the world's finest!



TOP LEFT: Philadelphia — 300mm Sonnar, f/16, 20 sec. TOP RIGHT: Los Angeles — 500mm Nikkor, f/32, 1/5 sec. BOTTOM LEFT AND RIGHT: San Francisco shot in ad — 500mm Nikkor, f/32, two minutes.

WORKMAN holds the plug for the remote control line which automatically fires strobe and camera at specified intervals.

CAMERA tow truck in action. Stainless steel cable on the right is for the housing.



INTERIOR of the sewer sequence camera. The strobe reflector and the camera are mounted on the face plate (left).

Seattle Scans Its Sewers

Progressive Northwestern city uses cameras for checking the condition of its vital drainage arteries. Other cities may adopt technique.

A new method of checking the roofs and sides of municipal sewers which pinpoints dangerous areas nearing collapse has achieved a high degree of reliability in Seattle, Wash., where the City Engineering Department now uses a specially-designed sequence camera for taking color pictures of the underground structures.

The use of photographic records for evaluating conditions within the city's sewers is the outgrowth of a serious cave-in which occurred in the winter of 1957, resulting in considerable damage to both public and private property. Realizing that this sudden structural failure indicated the need for a more effective method of maintaining constant checks on the city's sewers — other than walk-through inspections with occasional still photos of suspected areas — the department launched a study of the problem.

The best means, it was concluded, would be a series of still photographs taken at close intervals, thereby providing a complete check of all surfaces above water. After a preliminary survey revealed there was no existing equipment on the commercial market which would meet their requirements, the department set out to design and build a unit which would make it possible to photograph sewers ranging from 15 to 144 inches in diameter.

The housing for the camera which resulted from this study is a 500-pound practice bomb shell case of 16 gauge steel which measures 12 inches in diameter and 31 inches in length. The large end was machined to accept an "O" ring seal and a cover plate which has openings for the camera lens and the strobe. A ¼-in. plexiglass sheet covers the strobe opening and a ¼-in. piece of plate glass protects the camera lens.

The camera is a 35mm Robot Recorder, model 24, with a Schneider Xenagon 30mm, *f*/3.5 lens, 200-foot film magazine and a 12-volt DC film advance motor. To prevent the possibility of any malfunction when in operation far underground, the shutter has been removed, which leaves the first and last frames of each sequence lightstruck.

Light source for the camera is a specially-designed Ascor strobe with a 50-degree reflector which operates from a 12-volt nickel cadmium battery. The transistorized power supply has a three-second recycling time and an output of 50 and 100 watt/seconds.

The camera can be rapidly removed from the housing by taking out four bolts on the face and pulling the cover plate forward. The strobe reflector and camera are both attached to the cover plate, with the strobe power supply and batteries located about mid-point in the housing.

When photographing sewers ranging from 15 inches to six feet, the camera is strapped to a metal skid which tilts it upward at a 30-degree angle. For sewers larger than six feet, the unit is placed on floats in such a manner as to have the same upward

continued on page 70

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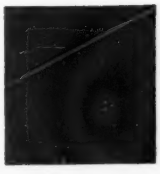

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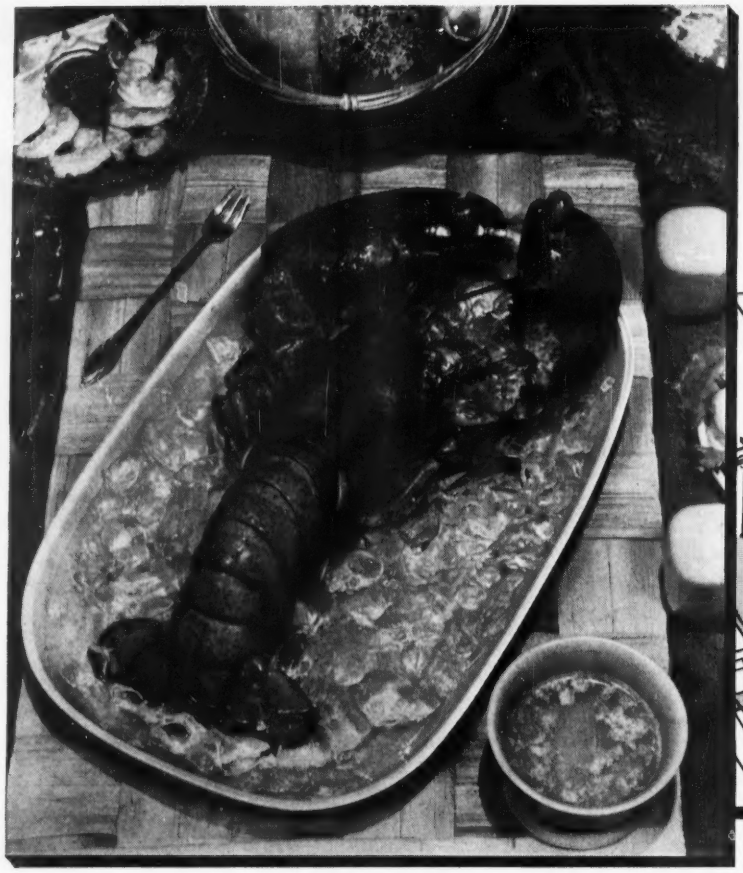

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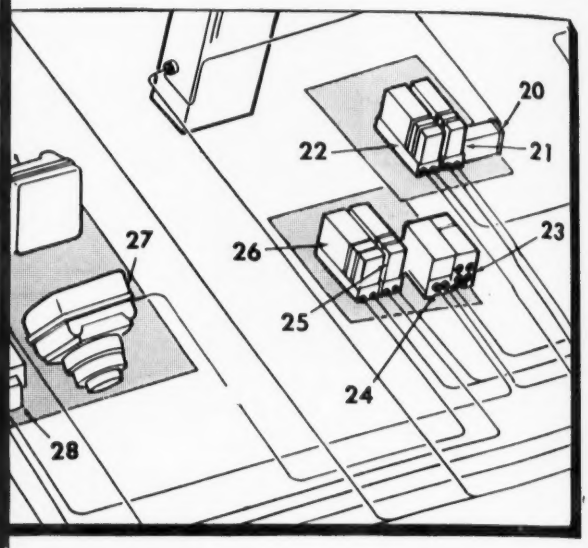

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lennox

continued from page 58

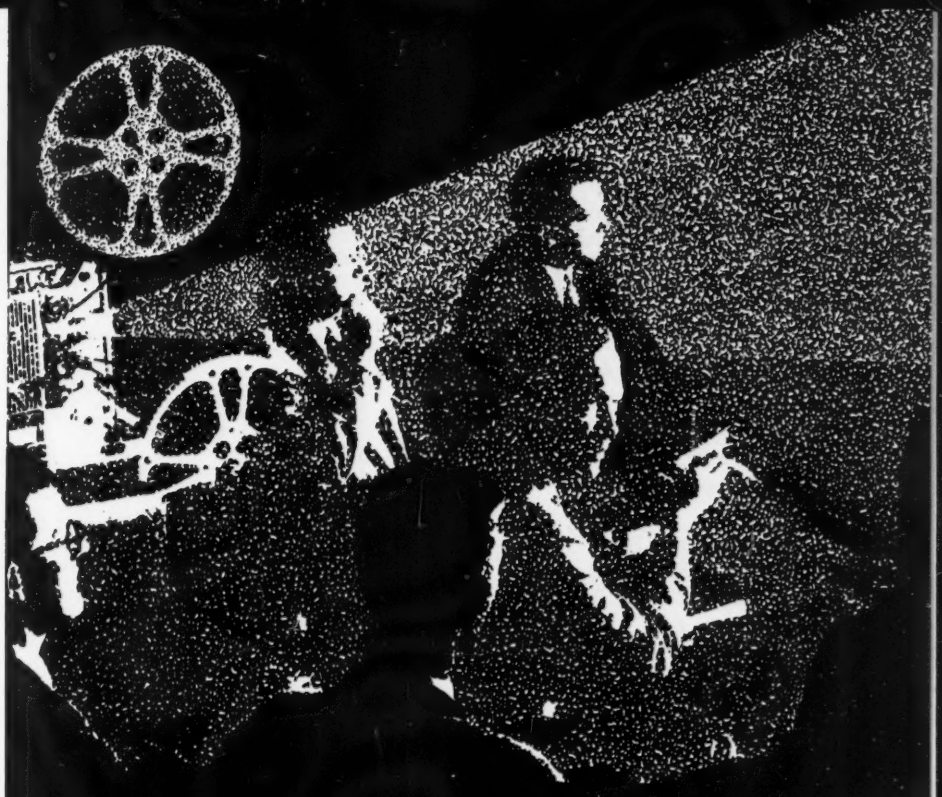
the laboratory, the machine is also used for blue-line prints where needed for our own shop work and also a good many of the memorandums that go out in quantities that are too large to make by way of carbon copies and yet too small to consider making mimeographic stencils.

"Our present process works out very satisfactorily in view of the fact that we make frequent changes and improvements in our equipment which must be reflected on the original laboratory prints and conveyed to each of the manufacturing divisions. This system allows us to change the original and mail out the five or six duplicate originals as required, thus getting the information to all divisions.

"The problem of making frequent changes on our prints," Mr. Greiner continued, "is easily taken care of by our release method because it allows us to give each of the producing divisions a reproducible sepia from which they can make their own required number of blue copies. Otherwise we would have to send out many more blue-line diazo prints than we do sepias. This system also gives us the opportunity to maintain standardization between producing divisions."

Packaging at Lennox has been aided by the use of the diazo equipment in headquarters and branches. Master tracings of carton specifications are used to run translucent and duplicate originals in a matter of seconds for distribution to the plants which need carton specifications. The branch plants, in turn, make copies for use within the plant and for carton suppliers.

Although Lennox started about six years ago to improve the speed and quality of its essential graphic reproduction, the company has found that every aspect of its operations — from original design to final invoicing — has benefited from the low cost and convenience of diazo. □



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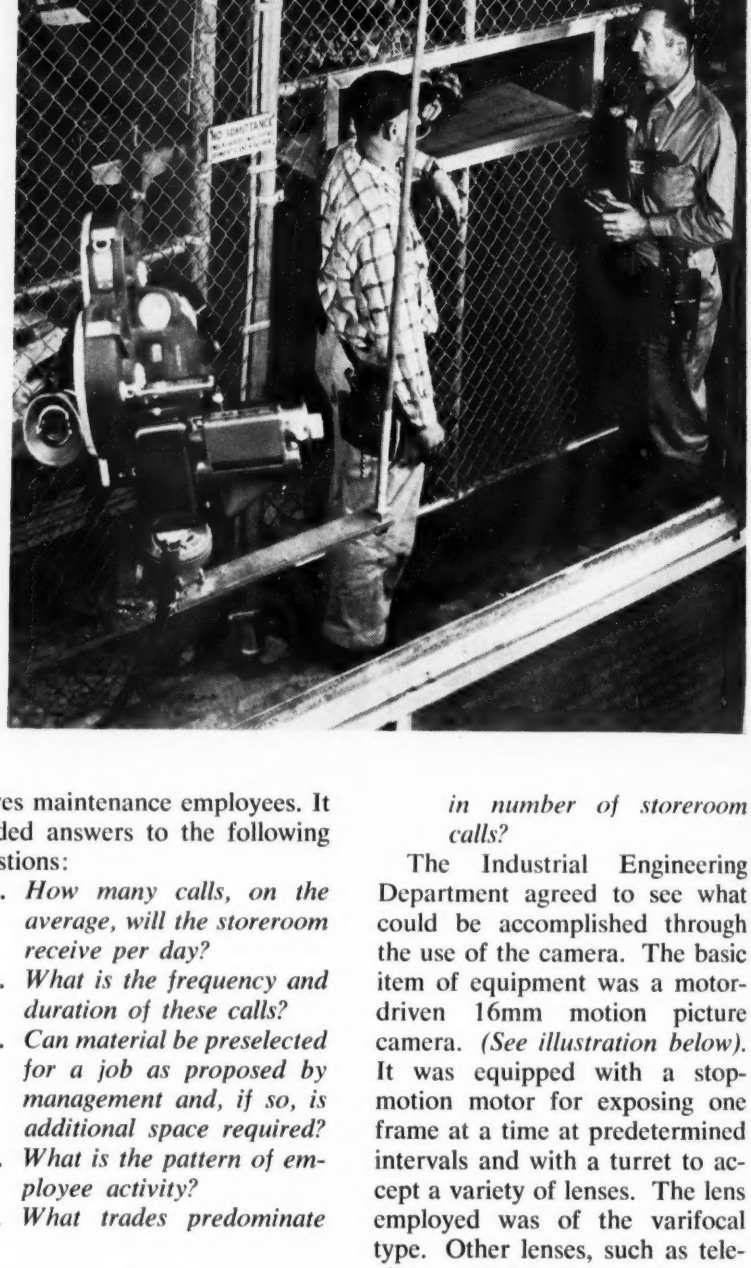
What Happens In The Storeroom?

Time-lapse studies provided the answer for a Western Electric factory-efficiency improvement team.



A Maintenance Improvement Program, guided by a team of Maintenance Supervisors and Industrial Engineers, has been in progress at the Burlington, North Carolina, location of the Western Electric Company for some years. This team, in addition to using the standard methods for gathering data, has applied time-lapse camera studies in obtaining storeroom service information.

Recently, the Plant Maintenance Department wanted to evaluate the storeroom which serves maintenance employees. It needed answers to the following questions:

1. *How many calls, on the average, will the storeroom receive per day?*
2. *What is the frequency and duration of these calls?*
3. *Can material be preselected for a job as proposed by management and, if so, is additional space required?*
4. *What is the pattern of employee activity?*
5. *What trades predominate in number of storeroom calls?*

The Industrial Engineering Department agreed to see what could be accomplished through the use of the camera. The basic item of equipment was a motor-driven 16mm motion picture camera. *(See illustration below).* It was equipped with a stop-motion motor for exposing one frame at a time at predetermined intervals and with a turret to accept a variety of lenses. The lens employed was of the varifocal type. Other lenses, such as telephoto and the wide angle units, were available if the situation required. An intervalometer provided automation in this camera study.

A Timing Device

The intervalometer is simply a timing device connected to the power source to provide impulses which control the interval between pictures taken by the camera. It is preset to the desired interval. Once the camera is properly mounted and auxiliary control units connected, needed information is automatically recorded on film. Today's fast film and lenses virtually eliminate the

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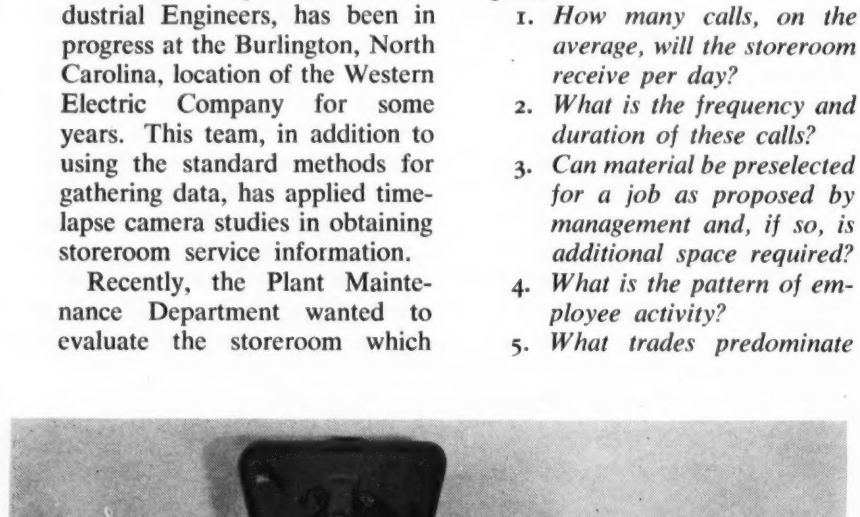

Equipment used in Western Electric's time-lapse study of storeroom activity.

need for supplementary lighting to make satisfactory studies.

Following Processing

Following the processing of exposed film, a detailed analysis was necessary to obtain usable data. For this part of the study, a micromotion analysis projector was required. With it engineers, from visual observation, ascertained the desired information.

At the Burlington location, a two-day time-lapse study of 6800 observations was used to provide storeroom service information for supervision. In order to prevent misunderstanding of the reason for the study, personnel involved were given a thorough briefing by their supervisor to inform them of its purpose and scope. The camera was mounted to give an unobstructed view of the area under observation, and the selected cycle time was preset into the intervalometer. The data obtained provided conclusive answers to management as to the number, frequency, and duration of the requests for service. Other conclusions drawn from the study supported maintenance management's proposed establishment of preselection routines and acquisition of additional space for these operations. Better planning on the part of the tradesmen has resulted since frequent returns to the storeroom by certain individuals as revealed by the study indicated that they did not always obtain a complement of tools and supplies before going to the job. The film was shown to the personnel involved.

Proposed uses of the time-lapse camera in our Maintenance Improvement Program are to establish job tours and job standards in small tool repairing, machine rebuilding, and electric truck and other repair operations. It will also be used when applicable in our construction operations to establish job standards and it is anticipated that it may supplement and to some degree replace our work sampling operations when the work is confined to camera range. □

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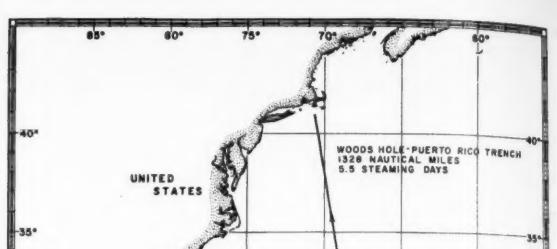
THE VOYAGE OF THE CHAIN



CHAIN CRUISE PLANS called for operations indicated on this map prepared before embarking.

Photos lead to important geological discoveries.

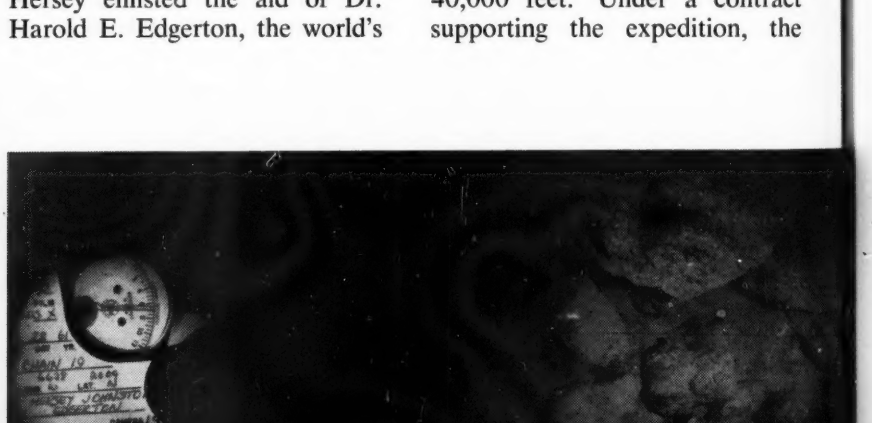
by **JAMES HUGHES**
Executive Editor

On June 13 the research vessel *Chain* left the Woods Hole Oceanographic Institution of Massachusetts, bound for a point off Puerto Rico. The goal of the scientific party aboard: to bring up from four miles under the sea the first rock specimens ever obtained from the deepest layers of the earth's crust.

First, of course, the samples had to be located. To help accomplish this phase of the program, Party Chief Dr. John B. Hersey enlisted the aid of Dr. Harold E. Edgerton, the world's greatest authority on deepwater photography. Dr. Edgerton came aboard with his ST-9 Edgerton Deep Underwater Cameras and a Debrie film processor.

The cameras were his famous double-ended ones. At the same time that one frame of film is exposed to show what's in Davy Jones' locker, another is exposed to record such data as the time and location of the shot. The cameras have been built to withstand the pressure at a depth of 40,000 feet. Under a contract supporting the expedition, the

DR. HAROLD EDGERTON (right) and Curtiss D. Wiler check out two of Dr. Edgerton's double-ended sea cameras.



CHAIN EXPEDITION photographs like this one made by Dr. Edgerton paved the way for the dredging which resulted in bringing up from the ocean floor the first rock specimens ever obtained from the deepest layers of the earth's crust.

cameras have been modified to include new Hopkins *f*/4.5 lenses.

The *Chain's* destination was the "Puerto Rico Trench," sort of a Grand Canyon under the sea. This was not Edgerton's first visit to the Trench. He had been there with the famous French oceanographer Cousteau and, in fact, photographs made by Edgerton on these earlier voyages had raised Dr. Hersey's hopes that it would be possible to dredge up samples of layers in the earth's crust that men had never seen directly before. The photographs indicated that in the Trench oceanic crust rocks crop out through the sediment and thus are available for inspection and sampling.

Upon reaching the Trench, Dr. Hersey first made a hydrographic survey of its north wall. This involved a 30-hour zigzag course with accurate measurement of position, time and depth. Then cutouts were made and fitted together so that the lay of the sea bottom could be visualized. The spots where rock photos had been obtained in March, 1960 were located so that they could be tried again.

Then Edgerton got busy with his cameras and lights. Two complete sets were ready to go. When one camera was on its way to the bottom — a four hour trip — the other was being loaded and its batteries charged. As soon as Camera #1 hit the deck, a cable was attached to Camera #2 and down it went.

It actually was not as simple as it sounds because the weather was bad with decks awash. Furthermore, there were some electrical problems which caused Edgerton to strain some before results finally came.

Fortunately, there were no leaks. The camera windows, cases and terminals withheld the 11,000 pounds per-square-inch water pressure completely. Edgerton had great confidence that this would be the case since he had experimentally checked and

continued on page 71

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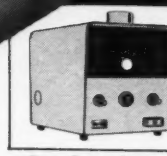
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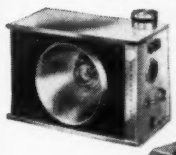
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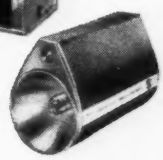
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seattle sewers

continued from page 62

angle. This inclination enables the lens to photograph about 270 degrees of the sewer's vertical axis. The resulting field of view extends from the water line upward, encompassing the sides and roof of the sewer, which are the areas subject to stress and failure.

In order to obtain the maximum amount of information, all photographs are made on high speed Ektachrome. Among the advantages of using color film is that, when projected, the color transparencies bring out possible areas of failure much more readily than black-and-white film. Also, color film records mineral deposits resulting from ground water as a reddish color. In time, such deposits can build up and impede the flow of sewer water.

The operating procedure for the camera requires two trucks, one containing the special equipment for towing the unit. After the trucks are situated over manholes at two separate points, the camera tow truck floats a cable downstream where it is picked up and hooked onto the pointed nose of the housing. A power cord for the remote control is also attached to this cable. The camera is then lowered into the sewer on its metal skid, the lens and strobe pointing in the direction opposite that to which it is to be towed. At a given signal, transmitted via radio, the tow truck begins hauling the unit back through the sewer, the strobe and camera being fired automatically at specified intervals.

As all photographs are taken in total darkness, the primary exposure variables are the reflectivity of the walls — concrete, clay or brick — and the power of the strobe — 50 or 100 watt/seconds. For concrete walls, it is necessary to reduce the aperture one stop and for sewers up to six feet in diameter, the strobe unit is set at half power or 50 watt/seconds.

In computing the rate of travel, a margin of 10 to 20 per cent overlap of each frame has been provided, in order to make certain that photographs of every foot of the sewer are made available for study by the engineers.

To maintain the desired rate of travel for the housing during the photographic inspection of the sewers, the department designed and built a cable meter and tachometer which permits the operator to determine the exact rate of travel for the camera. An integral part of the cable meter is a 6 v, 30 ma firing switch which can be set to fire the camera and strobe automatically at any interval from one to ten feet. A manual control is also provided.

To complete the set-up, the department's engineers also designed a slip ring for the AC source which operates the remote control, and modified a hydraulic winch so that it could handle the 3,000 feet of 3/16 in. stainless steel tow cable and remote control line cord used with the camera.

If the film magazine is exhausted while the crew is in the field, new film can be quickly replaced by using a changing bag.

SETTINGS FOR HIGH-SPEED PHOTOGRAPHY OF CLAY OR BRICK SEWERS

Sewer Diameter	Aperture	Watt/sec.	Travel (ft. per min.)	Strobe interval (time and distance)	Focused at/ft.
15 inches	f/16	50	36	4-5 sec./3 ft.	3
21 inches	f/11	50	36	4-5 sec./3 ft.	5
30 inches	f/8	50	36	4-5 sec./3 ft.	7
72 inches	f/4.5	50	36	12 sec./5 ft.	10

chain voyage

continued from page 69

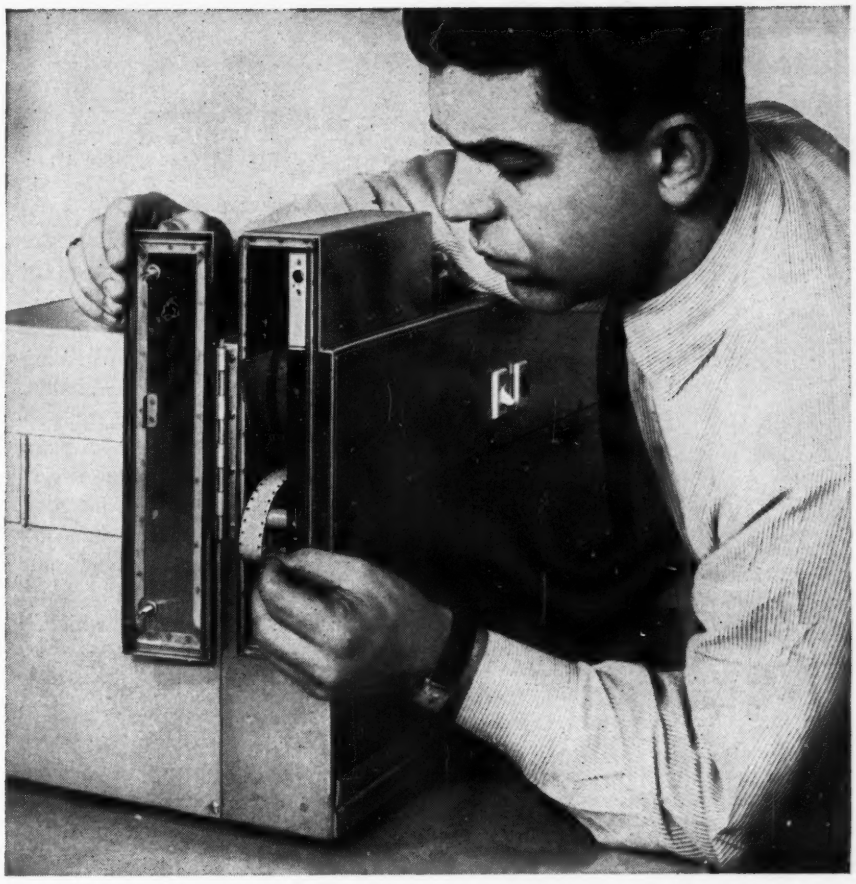
rechecked the critical items in the 16-inch naval shell pressure tester at the Massachusetts Institute of Technology.

Many of the bottom photos showed a flat mud surface, but with rocks now and then. Photo run #9 showed nothing but rocks with an occasional patch of mud.

The cameras were used at about 15 to 20 feet off the bottom as measured by a pinger. Illumination was produced by the discharge at 50 watt-seconds into a G. E. FT251 flash lamp at six second intervals. The cameras operated for 50 minutes, producing 500 exposures. Plus X film was used in one camera and Super Ektachrome in the other. The cameras were arranged to give stereo pairs of photos.

With the photographs revealing plenty of rocks, Hersey decided to have a go at them with a dredge. There is a weak link in the cable-dredge connection which parts at a 1500-pound pull. On Dredge #2 this weak link parted when a solid rock was struck. A safety chain to the dredge brought it back to the vessel and in the broken chain bag was a rock 10 inches in diameter — a rock from the lowest layer of the earth's crust.

The trip wasn't all work. Edgerton went fishing one night. His goal was to "hook" a camera and strobe he had lost on a previous visit to the Trench. His tackle consisted of a five-foot length of 12-inch pipe upon which was welded a collection of steel straps and pipes to form barbs that might snarl the camera or the three-mile long quarter-inch cable that was attached to it. The depth was 2800 fathoms. For one entire night he dragged his rig across the area where the camera is supposed to rest. "Either we missed the goal," he told me, "or someone has picked it up already! We will have to try it again when our fisherman's luck is greater." □



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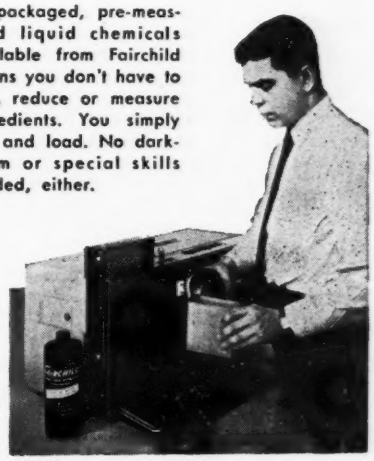

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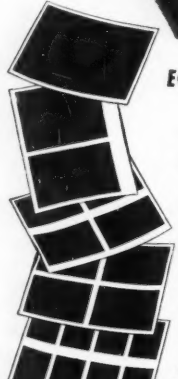

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roundtable

continued from page 15

which might be a bad way to make a point, I am especially good in certain areas of photographic coverage and only adequate in others. Sure I could make a stab at making pictures such as Irving Penn makes, but they still wouldn't be Penn pictures. Neither could the in-plant man come up with the same coverage as Art d'Arazien for the good and simple reason that he isn't d'Arazien. But neither Penn nor d'Arazien are capable of turning out the kind of pictures at which I, or the in-plant man, excels.

Each of us, according to his temperament, can create pictures. Unfortunately, some of our skills are not as valued as others moneywise. Penn's pictures, and those of d'Arazien as well as other name photographers, are used to sell the company's products and, therefore, the output of these photographers is a valuable asset to the company. The in-plant man is part of the production cost, and this must be kept down. However, as we use photography to help keep costs down, our value to the company becomes greater.

Those Pangs of Envy

I have been a photographer for 36 years and have suffered, too, the pangs of envy when some big name photographer came in over my head. I was honest about it, though, and realized that I just wasn't capable of turning out the kind of picture the man that was brought in could produce. I am not saying that there aren't isolated instances when in-plant men can produce great pictures, but when a company is willing to spend $56,000 for a full page ad in LIFE, they want the best, not the most adequate, but the best they can get!

Another delusion many in-plant photographers have in connection with this matter is that the name guy is a lousy technician. He shoots hundreds of pictures of the same subject so, they say, "How can he miss?"

Don't let that fool you. Penn, for example, is a superb craftsman. He shoots a lot, as do other top-notchers on assignment, simply because he won't leave a subject until he feels that he has saturated it, and not because he is not sure of his exposure. If the last were true, all he would need do is to make three exposures and bracket them, and then at least one piece of film would be well exposed. Since he is an artist, his ability lies in the area of creating pictures. Technicians can be hired fairly cheaply. Artists, creative ones, come high.

Individual Stylists

They either use a lot of light, or very little, not because they try to impress the client by putting on a circus, or just because they are lazy, but rather because this is the way they operate.

The point I am making is that photography, and especially industrial photography, is a highly specialized art with many specialties within the specialties. After you've seen a photograph made in your plant by an outsider, very often the temptation is to say, "for this the company spent a thousand or more bucks!" Sure, everything is simple after you've seen the picture. Generally, the truth of the matter is that the in-plant photographer never even "saw" the picture in all the years he has been working in the plant. This is no commentary on him, since he is kept busy on the job for which he was primarily hired.

Too many photographers acquire ulcers worrying about outside photographers. They consider it a commentary on their own skills. Brother, it just ain't so! A doctor calls in specialists when he feels he is only adequate to treat certain diseases. Engineers call in consulting engineers when they run into a specialized problem. Lawyers call in specialists in their own field when they feel that the specialists skill is needed over their own adequacy. They don't feel that their own skill in their own field is at stake. Don't forget, it isn't true that a photographer is a photographer is a photographer. □

instrumentation

continued from page 19

els with the new flash unit is facilitated by glass portholes on either side of the test section of a shocktube wind tunnel in which the reentry shock tests are conducted. By positioning the flash unit and a pair of light-collecting lenses about four feet from one of the portholes, a lightbeam can be directed through the shocktube and focused on the lens of a camera situated on the opposite side of the tube.

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As the airflow engulfs the models, their thin wire suspensions are swept away, leaving them in free flight for a few thousandths of a second. During this time, the electronic flash burns brilliantly at even intensity and allows the models' displacement to be recorded on film by the high-speed framing camera. By the time the airflow sweeps past the models, the electronic flash has abruptly turned off to terminate exposure on the film.

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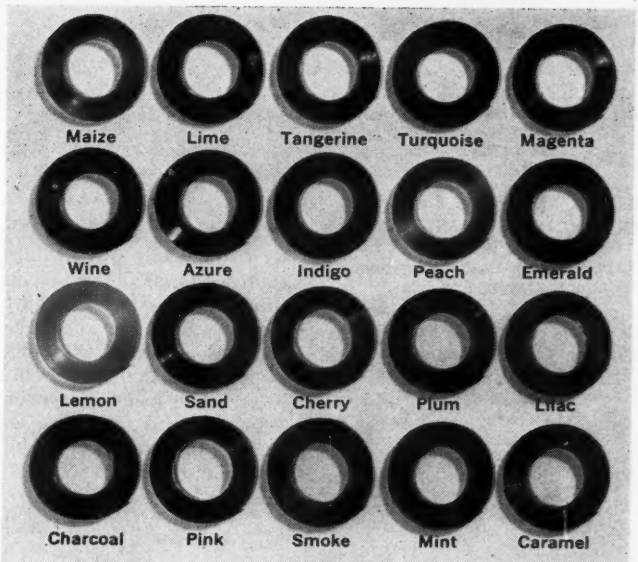

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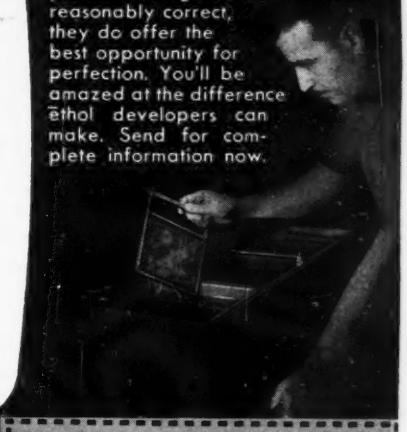

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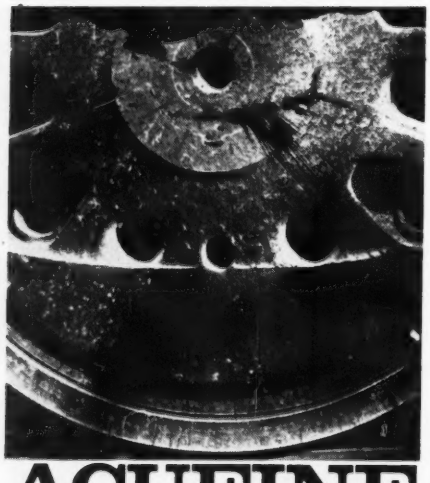

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new products

continued from page 10

techniques with a high intensity light source such as direct process or blueprint machine or a vacuum printer. A yellow or orange sheeting must be used as a filter between the light source and the film. The material accepts ink, pencil or typewriting and has a fine-tooth, glare-free white matte surface on both sides. Rolls up to 52 inches in width and sheets in standard drawing sizes are available.

Micro Camera 105

What is claimed to be the first fully automatic micro photographic camera to fit any microscope and having both detail and field-integrating exposure mechanisms has been developed and introduced by *E. Leitz, Inc.* The new Orthomat Micro-Camera utilizes a 36-exposure film magazine which is actuated by a foot pedal. A photo multiplier tube reads the exposure area for either an integrated or detailed reading at the push of a button. Operations are virtually all automatic, minimizing the chance of failure. The range of exposure time includes those of photography of fluorescent specimens – one half hour exposures and longer, or as short as 1/100th of a second. Another outstanding feature of the instrument is that the film magazine can be changed at any time to permit the use of color or black and white.

Still Zoom Lens 106

Single lens 35mm reflex camera owners will be pleased to learn that a low-cost zoom lens is now available from *Encino Engineering.* The Astronar Zoom is only 6⅞" long and covers the focal length range of from 95 through 205mm. The lightweight 21-ounce lens focuses down to 6 feet and has a click stop diaphragm with openings from *f*/6.3 to *f*/22. Performance is said to be excellent with a high order of sharpness including excellent definition at the corners of the field. Currently available in mounts to fit the Pentax, Practica and other cameras, the Astronar Zoom will soon be adaptable to Exakta mount cameras and other types with special interchangeable fittings from Encino Engineering. Another outstanding feature of the lens is its relatively low price, only $174.95 including a leather carrying case.

Training Device 107

Another tool designed for use in training assembly line workers has been introduced by *LaBelle Industries, Inc.* The Teleguide system consists of a viewer which accepts the magazine holding 36 35mm slides. Screen size is 8" x 5½". The sound portion of the system utilizes standard Cousino Echo-matic cartridges with a playing time of up to one hour. Inaudible signals on one of the tape tracks trigger the picture for subsequent operations. Programs may be prepared with the LaBelle Teleguide Console which has the recording and trigger signal facilities. Modular construction of the view playback mechanism permits replacement of individual components with negligible down-time.

Camera Support 108

An adjustable shoulder-pod with pistol grip is now being offered by the *Arriflex Corporation of America* for use on its 16mm series. The contour grip of the Arriflex-16 itself provides the right hand grip, and the pistol grip section of the new accessory is anatomically shaped for the left hand. A trigger mechanism is coupled to the camera's electric switch for easy operation. A special counter-plate is provided which permits the pistol grip alone to be used on the Arriflex-16. Price: $68.

Fluid Head 109

A versatile pan head for motion picture cameras or telescopes which features an exclusive Viscodyne system has been introduced by *T. A. Manufacturing Corporation.* Called the Thomas 16 Fluid Pan Head, the unit may be used under extreme temperature ranges from –60F to more than +212F and fits any camera or tripod. Tilt or pan tension may be adjusted to fit the specific camera being used and in addition the head can be locked at any angle without disturbing the tension control. This is said to allow the operator to go back to the exact position and sequence without wasting valuable film and time. Price: $149.50.

Projection Paper 110

Ansco, which recently introduced their VeeCee or Variable Contrast Enlarging Paper, has now announced VeeCee Rapid, a higher speed version with a speed comparable to that of Jet Paper. As with its predecessor, the material may be used with either of the variable contrast filtration systems and is balanced for use with tungsten light sources as well as fluorescent lamp type enlargers. An added advantage of the new paper is that prints can be forced or pulled in processing to match density without shifting contrast or image tone.

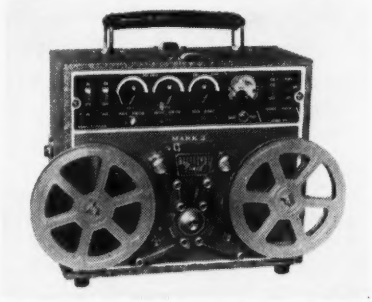
Overhead Projector 111

A low silhouette extremely cool overhead projector which features a washable baked vinyl finish and accommodates transparencies up to 10"

x 10" is being produced by the *Buhl Optical Company*. The Model 7000 Koolite is being introduced as a companion to the Model 6000 Koolite and also features a built-in cellophane roll holder for projecting hand written notes. The efficient cooling system of the machine permits projecting transparencies for almost unlimited periods of time without distortion from overheating.

Compact Recorder 112

A completely self-contained recorder reproducer for double system motion picture recording has been introduced by the *Magnasync Corporation*. The Nomad Mark 2 is fully transistorized and weighs only 12 lbs. Power is supplied by a rechargeable



battery which delivers the 20 watts required for operation. Recordings are made on 200 mil track on split-16mm Nomad Film in lengths up to 400 ft. Other features of the lightweight unit include instantaneous "film-direct" monitoring, forward and reverse operation and rewind. Projector interlocks available. Price: $985.

Finder Accessory 113

A handy device designed specifically for low angle shooting, copy work, close-up photography and for shooting at right angles has been introduced by *Photographic Importing And Distributing Corporation*. The Accura Right Angle Finder also features an adjustable diopter eyepiece for comfortable viewing. It is easily attached to all models of the Contaflex, Retina Reflex and Heiland Pentax. Price: $19.95.

Electronic Flash 114

A lightweight electronic flash unit which may be used on either self-contained nickel cadmium battery power or AC is now available from *Kling Photo Corporation*. The Heliotron MM Autolectronic flash unit also features interchangeable battery packs, each providing about 60 flashes. Output of the Heliotron is sufficient to give a guide number of 33 for ASA 10 Kodachrome at 1/1000 second. The fully transistorized circuit features an automatic relay to maintain full capacitor charge without unnecessary battery drain. Re-

continued on page 80

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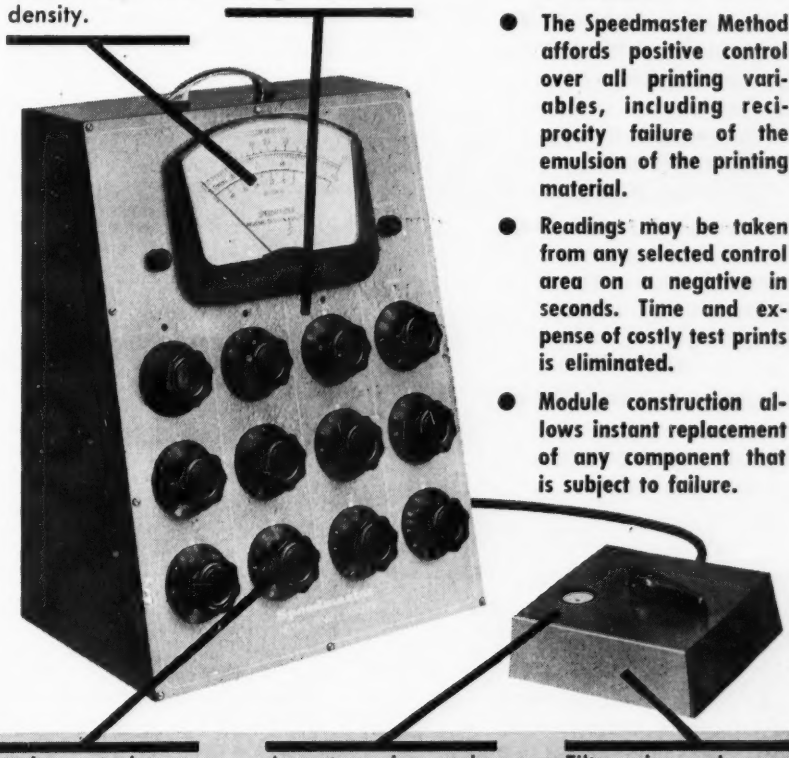

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GRAPHIC ARTS AND REPRODUCTION

Charts and Maps 201
Keuffel & Esser. 12-page full color brochure explains through graphic diagrams the fundamentals used in producing color separated charts and maps.

Choosing a Systems Chart 202
Duchart. 19-page manual explores the forms, treatment and preparation of charts for presentation.

New Litho Film 203
DuPont. Bulletin on new Cronar Ortho S graphic arts film with advanced emulsion, stable base and availability in all sizes.

Faster Diazo Paper 204
Tecnifax Corp. Info on diazo-blue paper, No. 214S, for users wishing to achieve higher production without sacrificing print quality.

Unique Meter 205
LogEtronics, Inc. Details on the Model C Focatron, a meter indicating sharpness and brightness in copy and view cameras.

Printing Film 206
Ulano Products. Data on Wetshot Foto-film which needs no darkroom and is executed in four simple steps for producing photo screens.

Trimmer/Cutter 207
Michael Lith. Data on the Kutrimmer in six models which cuts and trims up to 50 sheets in one stroke.

Pressure-Sensitive Tape 208
Johns-Manville. Reference booklet on the selection of and problems associated with pressure-sensitive tapes.

Vertical Camera 209
Robertson Photo-Mechanix. Bulletin on the new Meteorite Mark 1-A, spacesaving vertical camera.

Tracing Paper Characteristics 210
Charles Bruning Co. 16-page booklet covering manufacturing processes, materials selection and production of quality tracing papers.

Reproduction Lighting 211
Quartz Radiation. Spec sheets on high pressure mercury vapor lamps for use in whiteprint and blueprint equipment.

Self-Sticking Tapes 212
ACS Tapes. Info on latest line of self-sticking tapes in transparent colors with glossy or matte surface.

Graphic Arts Aids 213
NuArc. 32-page catalog on line-up, stripping and light tables, arc lamps, safelights and utility items.

Hand Lettering 214
Film Lettering. Booklet describing standard line of type styles available in custom and economy lettering plus 24 new type faces.

Ultraviolet Lamp 215
General Electric. Info on new lamp designed for use with those photoreproduction processes requiring ultraviolet radiation.

Blue Print Filing Equipment 216
Plan Hold Corp. Catalog outlines variety of portable equipment for blueprint, map and drawing storage.

Speed Easel 217
Ganz. Descriptive leaflet on Sing-L-Size easels.

Screen Process Equipment 218
Advance Process Supply. 200-page catalog of screen process colors, high-speed equipment for printing and drying, screens. tools and instruction sections.

CAMERAS, LENSES, ACCESSORIES

Optics and Photo Equipment 219
Edmund Scientific. 163-page catalog on optical, photographic and scientific equipment.

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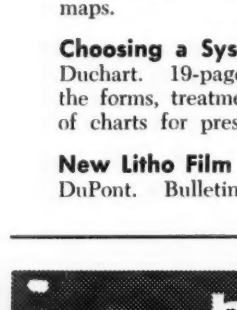

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Portrait Camera **220**
Beattie-Coleman. Details about new Imperial-90, a portrait camera which uses 3½" heavy-base roll film.

Automatic 35mm **221**
Ansco. Specifications on new fully automatic 35mm camera (Ansco Autoset) with f/2.8 lens having shutter speeds from 1/30 to 1/800 with self timer.

Picture-in-an-Instant **222**
Polaroid. Data on Type 55 P/N film pack which develops print and negative in 20 seconds outside the darkroom.

Single Lens Reflex System **223**
Minolta. Details on Minolta SR-1 system including camera, 14 lenses and 28 accessories in compact kit.

Automatic Cameras **224**
Agfa. Leaflet on the Agfa Optima family of automatic cameras, flash units and films.

Photo Catalog **225**
Burke & James. 147-page indexed catalog No. 261-A on full line of photographic and instrumentation equipment.

Hasselblad Camera **226**
Paillard, Inc. Literature on single lens reflex Hasselblad camera with interchangeable accessories.

Background Paper **227**
Photo-Tech. Info on background paper for the photographic trade, corewound, in 9 and 12 ft. widths. Variety of colors are available.

DARKROOM SUPPLIES, EQUIPMENT, X-RAY

Surfaces/Contrast Grades **228**
Eastman Kodak. 4-page pamphlet on grades of Kodak photographic papers including tables and development instructions.

Table Model Dryer **229**
Simplex. Data on the Hi-Gloss dryer with capacity over 135 8 x 10 S.W. prints per hour and takes up to 16 x 20 prints.

Color Process **230**
FR Corp. Info on new color print process enabling black-and-white darkrooms to double in color.

Laboratory Apparatus **231**
Nalge Co. 28-page catalog of plastic lab equipment including information on 22 new products.

Color Temperature Meter **232**
Karl Heitz. Data on 5-ounce Rebikoff precision instrument permitting direct readings of color temperature in degrees K and translation into correction filters.

Photographic Chemicals **233**
Plymouth Products. Details on full line of developers, replenishers and other processing chemicals.

Retouching Prints **234**
Retouch Methods, Inc. Leaflet on various retouching materials with detailed information on color print retouching colors.

Color Temperature Meter **235**
Kling Photo. Information on the Gossen Sixticolor which instantly shows color temperature of light source and filter required for correct balance.

Photocolors **236**
Webster Bros. Info on invisible colors for retouching and spotting of Ektacolor and Printon color prints.

Catalog and Darkroom Tips **237**
Anken. 24-page catalog includes info on Anken papers, films, emulsions, processors and chemicals.

TAPE RECORDERS

Tape Recorders **241**
National Better Business Bureau. 11-page booklet discusses the things you should know about the purchase and servicing of tape recorders.

Transistorized Tape Recorder **242**
American Geloso Elec. Info on the Unicorder 61, miniature 5 lb. tape recorder with no need for AC adapter.

Tape Cleaner **243**
Computer-Measurements. Info on high-speed, automatic shutoff magnetic tape cleaner, Unicorn Model T-7070.

Catalog Your Tape Library **244**
Ampex. Booklet on a new concept in subject identification of tape recorded material.

LIGHTING

Diffusion **246**
Beckett & Leonetti. Data on stock of aluminum diffusion scrims for all lights including single, doubles and halves; lightweight, durable and color coded.

Lighting Guide **248**
Natural Lighting. Pocket guide includes lens stop calculator and incident light table.

Pocket Size Barndoor **249**
Lowel Light. Info on new 4½ oz. barndoor for reflector floods which fold flat and attach without tools.

VIEWERS, PROJECTORS, SCREENS, SLIDES

8mm Sound Projector **251**
Vicom. Spec sheet on the Vicaudio Mark II, an 18 lb. Sound 8 Carryall projector with a self-contained 9 x 12" rear projection screen.

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102	108	114	120	126	132	138	144	150	157	164	171
103	109	115	121	127	133	139	145	151	158	165	172
104	110	116	122	128	134	140	146	152	159	166	173
105	111	117	123	129	135	141	147	153	160	167	174
106	112	118	124	130	136	142	148	154	161	168	175

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203	211	219	227	235	243	251	259	267	275	284	293
204	212	220	228	236	244	252	260	268	276	285	294
205	213	221	229	237	245	253	261	269	277	286	295
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208	216	224	232	240	248	256	264	272	280	289	298

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505	524	543	562	581	600	619	639	659	679	699	719
506	525	544	563	582	601	620	640	660	680	700	720
507	526	545	564	583	602	621	641	661	681	701	721
508	527	546	565	584	603	622	642	662	682	702	722
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513	532	551	570	589	608	627	647	667	687	707	727
514	533	552	571	590	609	628	648	668	688	708	728
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517	536	555	574	593	612	631	651	671	691	711	731
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517	536	555	574	593	612	631	651	671	691	711	731
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Reader/Printer 252
Photostat. Details on the Mark II Documat designed for easier viewing and higher contrast enlargements from 16mm and 35mm microfilm.

Audio Visual Catalog 253
Audio-Master Corp. Catalog listing slidefilm projectors and accessories, hi-fi record and transcription players.

Automatic Slide Projector 254
Spindler & Sauppe. Fact-sheet describing four basic Selectroslide models.

Photo Filing 255
Multiplex. Bulletin available on photo slide filing system for orderly classification, convenience, and protection.

Portable Viewer 256
Admaster. Lit describing portable attache case viewer for 10 x 10 overhead transparencies.

Electric Blackboard 257
Charles Beseler. Info on the Vugraph which projects what you write as you write it.

Versatile A-V Unit 258
C.O.C. Info on the Master 10-10, a fully automatic rear view slide projector, slide changer, and remote control unit.

Desktop Audio-Visual 259
Viewlex. Info on the Tabletalk, a self-contained combination 35mm filmstrip projector and 4-speed hi-fi in an attache case.

Sound Slidefilm Equipment 260
Victor Animatograph. Data on Victor/Soundview, a versatile fully automatic or manual sound slidefilm outfit.

"Cold" Type Reflector 261
Strong Electric. Info on "cold" type reflector and design change which permits changing the plane convex lens without removing lens mechanism housing for Model Universal Arc Slide Projector.

CINEMATOGRAPHY

16mm Action Viewer 263
S.O.S. Photo-Cine-Optics. Data on Ediola Action Viewers and Sound Readers.

Recorder/Reproducer 265
Magnasync. Data on the Nomad, a 7-lb. recorder/reproducer for motion picture work which cannot get out of sync.

Reflex 8mm 266
Paillard. Data on the Bolex Zoom Reflex 8 with an 8-40mm zooming range.

Film Cleaner 267
Computer Measurements. Data on the Unicorn solvent film cleaner which cleans motion picture film up to 300 feet per minute.

Newsletter 268
General Film Laboratories. Monthly *Rewind* discusses motion picture services and pertinent developments.

Stabilizer 269
T. W. Kenyon, Inc. Data on Kenyon stabilizers providing stability to hand-held motion picture and optical equipment.

Rapid Spray Processor 270
Houston Fearless. Data on Model S-120PN which processes positive film at 150 fpm and negative film at 100 fpm in five minute cycle.

Eliminate Threading 271
Baia Corp. Data on the advanced 16mm editor, the Baia 2000, with exclusive "slip-in" loading.

Splice and Repair 273
Florman & Babb. Info on Magic Mylar for repairing, replacing, butt splicing and strengthening overlap splices.

Motion Picture Equipment 274
Bach Auricon. "Catalog of Ideas" shows how sound motion pictures can help profit-minded executives.

Sound Techniques 275
Cine Magnetics. Monthly news letter about latest developments in magnetic film striping techniques.

Extra Days 276
Movielab. Handy calendar for the harried film maker which "rearranges" days of the month to give seven extra days and two Fridays per week.

Processor 277
Oscar Fisher Co. Data on the Autotrac Processall, an automatic processor with 7-min. cycle.

SERVICES

Complete Lens Service 279
Ray Campbell & Co. Data on complete lens coating and repair service for all makes and types of lenses.

Color Service 280
Kurshan & Lang. Data on color services available, including dye transfer prints. Ektacolor prints and custom color film processing.

Motion Picture Labs 281
Byron Labs. Data on complete one-stop studio and laboratory services for film producers.

Big Picture 282
Republic Color. Lit on quality color prints and transparencies in all sizes and quantities; specialists in giant color work.

Film Holders and Repairs 283
Hoffman Professional Camera. Bro-

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chure describing Hoffman equipment including film holders, bellows, slides and repair service.

New Wall Chart **284**
Bebell & Bebell. Shows prices and types of all color prints including Ektachrome, Ektacolor and giant transparencies.

Filmstrip and Slide Lab **285**
Manhattan Color Lab. Data on services from shooting master negatives to answer prints and slide mounting facilities.

Background Music **286**
Capitol Library Service. Free demonstration disc and info on Hi-Q background music.

Products & Services Catalog **287**
Benson-Lehner Corporation. Quick-reference folder and catalog sheets on record readers, plotters, photo instruments and services.

INSTRUMENTATION

Instrumentation Service **288**
Camera Equipment. Data on the new authorized service center for Beckman & Whitley cameras. Also info on other instrumentation services.

2-in-1 Tracking System **289**
Zoomar. Data on tracking system including 40" Reflectar lens, Trulex Automatic exposure control and 35-mm pulse camera, and a Vidicon TV camera with monitor.

Infrared Materials **290**
Servo Corp. 4-page folder on the properties of infrared transmitting materials.

Optics Facilities **291**
Elgeet. Bulletin on Elgeet's advances in optical engineering including a listing of its applications.

Photomicrography **292**
Gevaert. 29-page handbook contains technical info on photomicrographic cameras, illumination, resolving power and light sources.

MISCELLANEOUS

Heater Barney **294**
Birns & Sawyer. Brochure describes camera parka which protects in temperatures down to −60°F.

Telescopic Pole Set **295**
Bulkley Dunton. Data on adjustable pole set with 2-3 piece poles, 7 fittings and cross bar 110 in. long.

Special Effects **296**
Animation Equipment Corp. 4-page folder discusses how aerial image opticals can expedite production of effects.

Please observe the void date on Readers Service postcards (they cannot be mechanically processed after this date).

PhotoFiling **278**
Multiplex. Bulletin available on photo slide filing system for orderly classification, convenience, and protection.

Laminating Press **293**
Harco. 4-page brochure describing new laminating unit.

2-Sided Adhesive **297**
Kleen-Stik Products. Details on the new Tape Form in small dispenser package for mounting photographs.

Your Photo Library **298**
Macmillan Company. Catalog listing 24 books on photography and film making including the latest Focal Encyclopedia of Photography.

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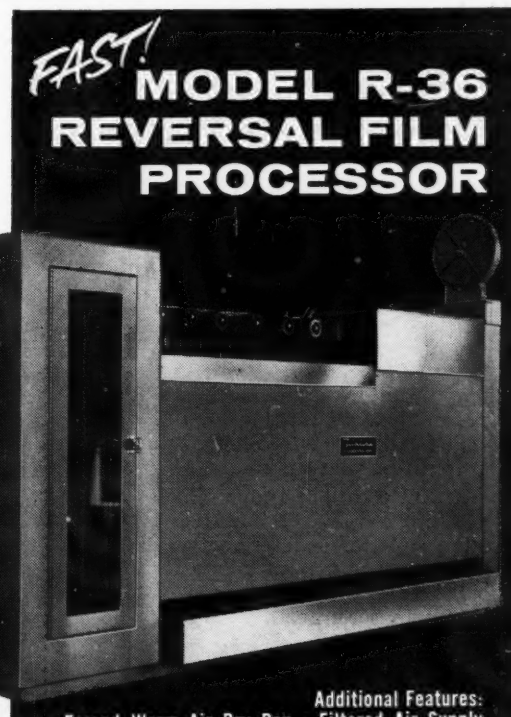

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new products

continued from page 75

cycling time, depending on battery condition, is 8-10 seconds. The unit may be mounted directly into the accessory shoe of a camera by means of its built-in retractable bracket or on an offset handle for reflex or press cameras. In addition a bounce flash adapter is supplied and also a standard PC plug shutter connecting cord which is recessed flush into the housing. Other features include a recessed ready light, easy to read large flash calculator, hand release button for open flash and an outlet for standard polarized flash cords. Price: $69.95. Added batteries in case, $11.95 each.

Display Tapes 115

A. C. S. Tapes, Inc. has released a complete line of 20 self-sticking tapes in 20 different colors. They range from 1/32" width to 1" and over. All rolls are 324" in length and come in either matte or glossy transparent forms. The latter type should be especially useful in the production of overhead transparencies. The matte tapes may be placed over artwork or copy without obscuring details.

Camera Accessories 116

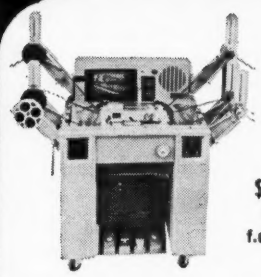
Birns & Sawyer Cine Equipment Co. has introduced a Sound Barney for the new Kodak Reflex 16mm camera. The device which makes the

camera into a sound unit for location work has a new long wearing lining of a special green material. The Barney will fit the camera with 400 ft. magazine and synchronous motor in place. A similar barney has been designed for use under low temperature conditions. A velcro-closure on the right hand side of the barney opens so the operator may have easy access to the controls of the camera. Price: Sound Barney, $124.50. Heater Barney, $184.

continued on page 82

ACMADE MARK II

EDITING TABLE



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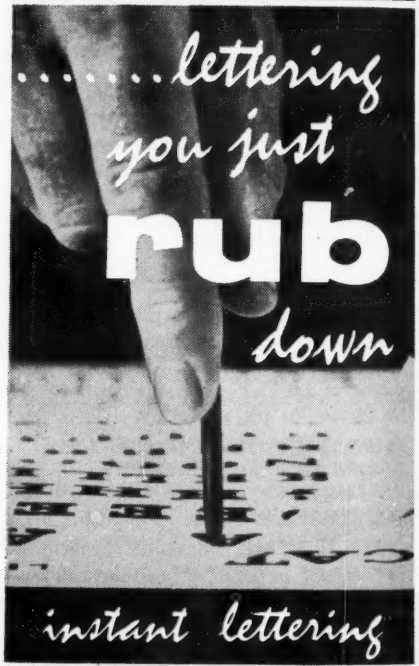

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BUSINESSMEN BRIEFED ON A-V

Attendees at the fall meeting of the Industrial Audio-Visual Association were briefed on the latest developments in the business communications picture. Delegates could choose between a partly humorous feature by Robert L. Strickland of Lockheed titled "How to Shoot Your Boss" or Gale C. Griswold's demonstration of the International Cooperation Administration's Sun-Powered Projector for use in underdeveloped areas of the world.

Robert K. Daker, president of Seminar, Inc., headlined his talk "Programmed Communication and Teaching Machines," while another aspect of this subject was covered in a question and answer session on automated learning led by Dr. Joseph A. Tucker, Jr. of U.S. Industries.

A workshop-discussion session was moderated by W. J. Connelly of Union Carbide and interspersed with demonstrations by the following IAVA members: Sheldon Nemeyer, General Dynamics; Wm. Buch, Lederle; Jerry Curto, Atchison, Topeke & Sante Fe Railway; Wm. Reynolds, Ohio Bell Telephone; Wm. Morris, Baxter Labs, and Robert McCaslin, Caterpillar Tractor.

MPO Videotronics, Fairchild, Cinebox, Polavision Bell & Howell and Eastman Kodak sent representatives to demonstrate the latest equipment for showing visuals.

Also on the docket at the four-day meeting, chairmaned by Daniel Rochford of Standard Oil, was the induction of the following new members: Fred Lloyd, American Republic Insurance Co.; Charles Woehrle, Minnesota Mining & Manufacturing Co.; O. Clifford Meadows, Chesapeake & Ohio Railroad Co.; Ira Thatcher, United Airlines; Joseph Bryan Stanaland, Jr., Southern Bell Telephone and Telegraph; Bernard I. Sherman, Schering Corp.; Kenneth L. Morton, Aluminum Company of America; C. W. Ryan, Jr., Idaho Power Co.; Peter D. Crane, S. C. Johnson & Son.

At the annual banquet James Craig of General Motors, IAVA Vice-President and Historian, spoke on the history of the group and reviewed significant audio-visual developments in the last fifteen years. The future of IAVA was covered by Kenneth E. Penney of Minnesota Mining and Manufacturing Company, who heads the group. He discussed some of the needed and potential audio-visual developments in the next 15 years.

The National Spring Meeting will be held in Milwaukee in April. Richard S. Piasecki is program chairman. □

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new products

continued from page 80

Camera Accessory 117

A great deal of flexibility in picture taking with the Contarex Camera is provided by the introduction of an interchangeable magazine back from *Carl Zeiss, Inc.* The back can be loaded in daylight with standard 35-mm cartridges and is easily attached to the camera. Special features of the new unit include double locks to prevent accidental openings, a dark slide which must be inserted before the back can be removed, non-removal of back unless the shutter is completely cocked and a spring-tensioned pressure plate to hold the film firmly against the film guides of the body. A leather case is also available which holds one back and an extra lens. Price: Back, about $55.

Film Treatment 118

A process designed to eliminate friction between the coils of motion picture film has been developed by *Peerless Film Processing Corp.* Called Hi-Impact Treatment FCP, it is said to toughen film to withstand repeated exposure to heat during projection without buckling. It is then conditioned to make it resistant to dirt, scratches, and brittleness. Freshly processed film as well as stock footage for use in continuous projectors may both be run through the treatment.

Roll Film Washer 119

Despite protests to the contrary, photographers will always be attracted to new gadgets. Some will make their job easier, others will just get in the way. One of the more useful of these to appear recently is the *Miller* Hurricane Roll Film Washer designed for users of 120 and 35mm film. The all-Lucite unit accepts 2 120 or 4 35mm reels or any combination and is said to thoroughly wash the film in 3 minutes. The device is relatively simple and uses a pair of water jets angled through the base of the washer which creates a swirling motion within the cylinder. Designed for Nikor- or Kindermann-type reels, the washer is connected to a faucet with a hose and requires very little water pressure to create the necessary water motion. Accessories for the Hurricane Washer will include nylon "T" and "Y" connectors so that a number of washers can be ganged up to one water outlet for production work. Whether washing time is three, six or nine minutes, the Miller Hurricane Washer is certainly a valuable aid in any darkroom. Price: $15.95.

A-V Screens 120

Brumberger, Inc. has introduced a line of wall and ceiling screens specifically designed for the audio-visual market. Called the University Series, they have been designed to offer maximum durability as well as a number of other quality features. The Model "B" wall and ceiling screen uses a flame and mildew-proof vinyl fabric in either beaded or matte white surface. A dust seal with specially molded slat tips that dovetail into the case to prevent shifting and tearing of the fabric is also included. Other features include a fluted black hexagonal case, triple chromed die-cast end caps and copper-nickel-chromium plated die castings at all wear points. Sizes available range from 30" to 96" width and extra large sizes from 6' x 8' to 12' x 12'.

Underwater Housing 121

The Polaroid Land Camera despite its name is now equipped to go underwater with the introduction of a special housing produced by *Raymond Development Company.* The unit, which is corrosion-proof and slightly buoyant in fresh water, can be used to depths down to 60 feet and more and no modifications to the Polaroid 850 Camera are required. With the Polaroid high speed film (ASA 3000), good pictures under the low light conditions which usually exist underwater can be more easily taken and since the Model 850 Camera automatically adjusts its aperture and speed no meters or estimates of exposure need be made. An interesting feature of the housing is the mechanism which permits the full roll of 8 exposures to be taken and also viewed underwater. For this purpose, a roller mechanism takes up the exposures from the back of the camera 10 seconds after they are made. This permits additional exposures to correct shooting angles. Some uses for the camera with underwater housing includes salvage work, underwater inspection and marine biology studies.

Darkroom Labels 122

Photographers who have made do for years with cut apart cans or nail polish labels for solution bottles can put aside these makeshifts now that a series of pressure sensitive labels are being made available by the *Crafty-Stencil Company.* The labels, which are printed with red enamel on silver metalized Mylar, come on a large sheet measuring 10" x 13". The chemicals listed are those of the Eastman Kodak Co. and may be easily read under a Series 1 A Kodak Safelight. The paper backing of the pressure-sensitive labels is easily removed and the label then applied to the bottle or tray. Price: $1.50, postpaid.

Picture Frame 123

The adjustable *Braquette,* a quick-

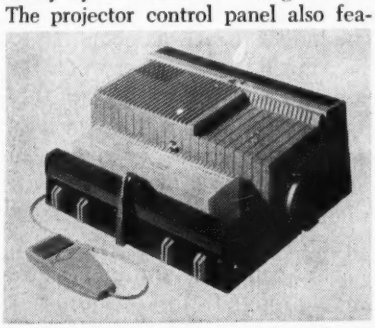
change photo frame designed for almost any size picture, has been improved and re-designed for even greater versatility. Its new lock is said to hold the heaviest pictures, even travel posters up to 42" in height. Tension springs which are part of the unit insure permanent framing. The Adjustable Braquette is also available in two different finishes; a crystal clear lucite or satin finished stainless steel. Price, $2.

Outlet Box 124

An economical multiple outlet box which should find many uses around the darkroom and studio has been introduced by *East West Products Company*. Dubbed the Octopus Box #0615, the unit features six heavy duty sockets and an on-off UL approved switch. A pilot light is also mounted on the front panel to indicate current flow and a replacable fuse is incorporated in the side of the case. Rated at 15 amps, 1700 watts, the compact unit weighs less than one pound and is priced at only $9.95.

Slide Projector 125

H. A. Bohm & Company has introduced a medium-priced slide projector with remote control feature. The Sawyer's "500" ER Projector includes a 12-ft. remote control cord with a handy cycle button to change slides. The projector control panel also features a directional control knob to reverse the direction of tray movement at any time during projection. Like other Sawyer's Projectors, the ER has a 500-watt lamp and shows all 2 x 2 slides in any mount. Optical equipment is a 4" *f*/3.5 coated anastigmat lens. Either TDC-type trays or Sawyer's Easy Edit trays may be used with the unit. Price, including a slide-on carrying case, is $84.95.



Aerosol Spray 128

A matte finish spray which is said to permanently eliminate glossy sheen and light glare from photographs and other smooth, reflecting surfaces has been introduced by *Krylon Inc.* The quick drying spray is equally useful on black-and-white or color prints, and may be used as a permanent dulling spray to subdue undesirable highlights in still and motion picture work. The new spray is available in 16-ounce cans at $1.95.

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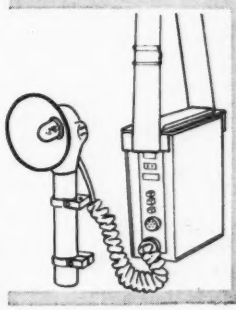

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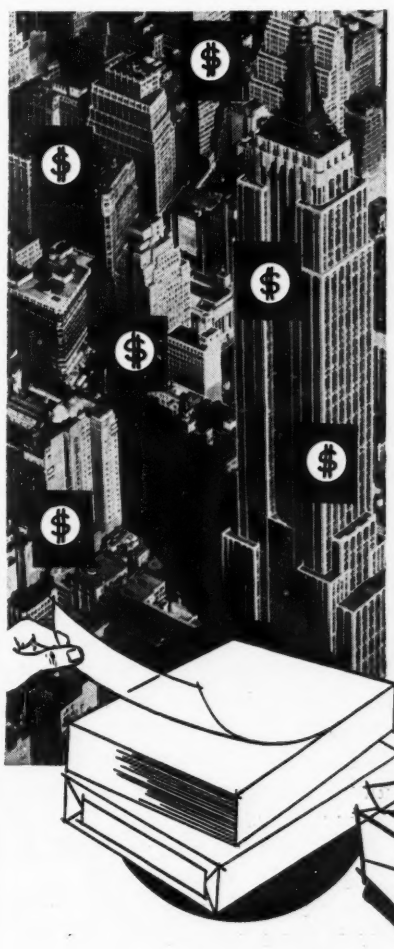

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photo briefs

jill english, associate editor

A Legal Start?

Itchy fingers often cause hydroplanes to jump the starting gun in competitions. Judges at such races have trouble determining whether the fleet little boats have gotten off to a legal start. Coming to their rescue is a Model 110B Polaroid Land Camera, used this year at the American Power Boating Association national finals held on Lake DePue in Illinois .

If photos, taken when the gun went off and developed in ten seconds, showed hulls over the starting line (an imaginary line connecting two buoys located in the water), the leading hull was disqualified and the rest of the field started again. On the restart, all hulls over the line were disqualified and the rest of the field permitted to continue the heat without stopping. Rules forbid more than one restart on any one heat, and only two heats to each race.

The Polaroid was mounted on a Quick-Set Husky tripod, with legs removed, and bolted to a metal plate anchored to the top of a seven-foot aluminum ladder. The ladder itself was anchored to the starting raft to prevent the camera's viewing angle from being jostled out of alignment with two starting buoys (one located directly in front of the raft; the other positioned on the lakefront opposite the raft).

The camera's shutter release was circuited to the six-foot starting clock by means of a solenoid. The clock faced upriver toward the drivers as they raced toward the starting line on which the camera was sighted.

WIRE glued at camera's film plane lines up with starting line. Horizontal line permits camera's use in vertical position.

lighting monsters

continued from page 43

Sometimes an industrial photographer's lighting problems are centered upon bulky equipment that has square lines. For example, to photograph the transformer measuring 35 feet high, 40 feet wide and 60 feet long shown in *Figure 3,* separation lighting at many points had to be considered. Here's how it was done:

Use Portable Elevator

In *Figure 3a* the camera was located on a portable elevator about 45 feet from the floor overlooking the entire transformer. On adjacent pieces of equipment, the lights were arranged as follows: a cine-light (1) on a 20-foot light stand, a cine-light (2) on an 11-foot light stand, a cine-light (3) four feet from the floor, a cine-light (4) on a 20-foot light stand and a cine-light (5) 10 feet from the floor.

Graflex extension lights were arranged as shown in *Figure 3a*: Light (A) was placed four or five feet off the floor and aimed toward the floor to get separation of the transformer radiators and (B) was placed 11 feet from the floor and aimed at the floor, (C) was placed on an 11-foot high stand above the subject, while (D) was placed on the floor to catch the front of the transformer.

Other Provisions

In addition, open bulbs were located behind each insulating bushing atop the transformer and two open bulbs were located between right- and left-hand radiator groups. Open bulbs were also placed behind the cabinet at the front of the transformer, while close to the front of the right side of the transformer radiator, a Graflex two-light unit was aimed at the floor to get separation of the cabinet from the floor. Beneath each radiator group, three single lights in reflectors set on the floor were used to create a separation highlight.

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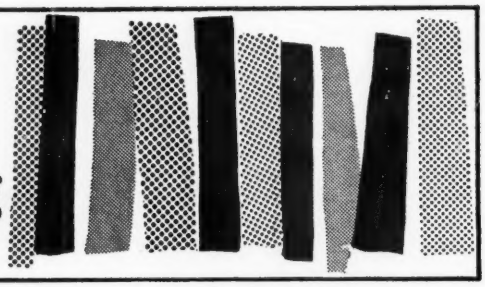

EVERYBODY'S PHOTO COURSE by Joseph Foldes, published by U.S. Camera Publishing Corp., 9 E. 40th St., New York 16, N. Y. Paperback edition — $1.95. Limited hardcover edition — $2.95.

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LINHOF TECHNIQUE DATA SHEETS Kling Photo Corporation, 257 Park Avenue S., N.Y. 10, N.Y., $1.50.

In 14 chapters – peppered with many illustrations, diagrams and tables – this booklet covers the operation of Linhof and Kardan Color cameras with tilting fronts and backs. It tells how to choose the right lens, as well as its use. Specific camera adjustments for special effects are clearly illustrated and explained, and the book even gets into macrophotography.

USING THE OPAQUE PROJECTOR Squibb-Taylor, Inc., 1213 South Akard St., Dallas, Texas.

This book aims at providing concrete suggestions for using the opaque projector in public and private schools, colleges, industry and business. One section graphically illustrates the wide variety of uses for opaque projection in business. Flip over the page and the reader is shown how to prepare graphic materials for use in this medium.

Although primarily designed for teachers, the book's subject matter has wide applications for industry and the businessman should find a wealth of ideas for inexpensive 3-D materials.

Got a movie question? Send it to Walter Strenge, ASC c/o IP Movie Clinic, P.O. Box 985, Hollywood 28, Calif. All questions will be answered and those with wide interest will be reprinted in his column.

PROCEEDINGS OF THE NATIONAL MICROFILM ASSOCIATION'S TENTH ANNUAL CONVENTION National Microfilm Association, Annapolis, Md.

There's a lot of solid information in this book which reprints *in toto* all the speeches given at this year's NMA convention. William Burleigh of Microsurance in his talk tells how to conduct a feasibility study which will determine if a company needs a microfilm system. Loretta J. Kiersky, librarian of the Central Research Department of the Air Reduction Co., had been scheduled to deliver a paper but was unable to, due to illness in her family. *Proceedings* has instead reprinted her fascinating bibliography covering 1955-1960 on reproduction of documentary information.

The effectiveness of the microfilm system at Redstone Arsenal is the subject matter of a talk by H. D. Patterson. William S. Hutchinson of the Armed Forces Support Center tells how microfilm is used in his military department. All in all, the transcripts should make interesting reading.

Proceedings also serves as a "yearbook" of the association. Pictures and biographies of all the speakers and Pioneer Medal winners are included. The book should be a valuable reference guide as well as a nice memento for all NMA members.

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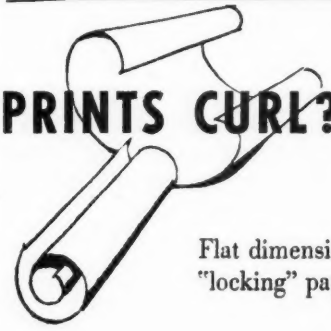

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About a Stereo Camera, Negative Viewing and Electronic Printing

Inventors in the past have produced a very fine assortment of cameras to be used in making binocular-type 3-D pictures. However something really novel in a stereo camera has just been granted a patent in the United States. This is a stereo camera which may be used to make photographs of the details of some special operation or manipulation in which the area of interest is so restricted that it is not possible to record the procedure in the ordinary way — i.e. with a camera in the hands of a photographer.

In the patent, chief emphasis is placed on its use in surgical photography but there are limitless applications for such a camera in industry. The camera can be fastened to the head of the person performing the manipulations to be recorded by means of a headband. The operation of the shutter is taken care of by a switch device which can be actuated by hand or foot. Movement of the film is taken care of automatically after the exposure has been made. The patent, #2,990,765, is owned by VEB Kamera- and Kinowerke of Dresden, Germany.

Breathes there a photographer who at some time during his career hasn't wished he could avoid the added step of making contacts in order to select the best shot to custom print. His problem may be answered by Helmut Heckscher of 48 Mount Vernon St., Cambridge, Mass., who has perfected a *Device to View a Photographic Negative as a Positive Image.* A coating of infrared quenching phosphor is applied to a very thin base of plastic material which takes the place of glass or quartz.

This phosphor-coated plastic is placed in contact with the negative to be viewed and, from the rear, is subjected to energy from a bank of incandescent infrared lamps passed through a red filter. Ultraviolet light is directed on to the opposite side of the phosphor base, causing the non-quenched phosphor to fluoresce. This positive image is viewed through the green filter on the side of the box opposite to that where the negative and phosphor base is mounted. Patent is #2,996,-617.

In photography, as well as almost every other field which uses mechanical and electrical apparatus, there is much talk of *electronic* devices which are supposed to improve, speed-up, or eliminate old established techniques and processes. A device which will add to this conversation among photographers has been disclosed in *U.S. Patent 3,000,286* now owned by Bush and Rank Cintel Limited of England. It is a printer of the type in which point-by-point illumination is controlled by the character of the negative being used. This control thus produces an exposure on the photosensitive material different from that of the original object. This type of printing system is of special value where the contrast range in the negative to be used is greater than that in the printing paper.

In this instance the device includes the use of a cathode ray tube, light from the screen of which is used to illuminate the negative point-by-point. The electron beam of this tube is deflected across the screen of the tube in one direction at a constant repetition rate and in a perpendicular direction. It is then imaged upon a negative, passing through the photo paper in contact therewith onto a photocell where a signal is developed which is used to control the brightness of the scanning spot to produce the desired alteration in the effective contrast of the negative. □

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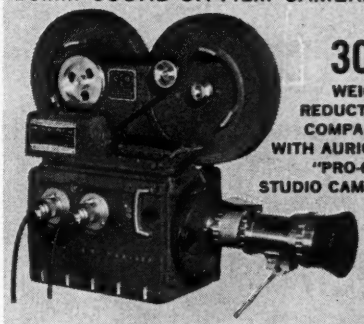

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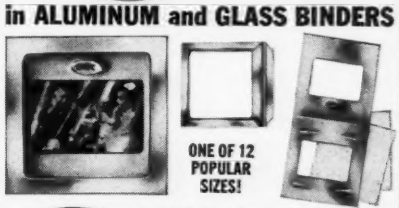

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In the Wake of a Hurricane

Business and industry discovered how vital microfilm was to daily operations only after deadly "Carla" hit them.

When businessmen of the Texas Coast returned recently to clear away the ruin left in Hurricane Carla's devastating wake, they found their losses fell into two categories:

(1) Material loss — which was bad enough, but could be eventually replaced with a reinvestment of money and hard work.

(2) Loss of records — which was so aptly described by an attorney surveying the soggy remains of his deeds and other vital paperwork as "like losing all the papers and pictures in your billfold — they're of no value to anyone but yourself, but to you they're priceless."

The one factor that saved such records — other than lugging heavy file cabinets to second stories before the storm hit the Gulf Coast — was the use of microfilm.

One businessman using microfilm was H. A. Jorgensen, owner of the Jorgensen Construction Company in Freeport, Texas, where flood waters were four feet deep in many homes.

"I keep all my 'critical' architectural drawings on microfilm, and I stored the aperture cards out of town when this flood came. I didn't suffer much damage here, anyway," he added, "but I am glad I was able to move them. I wish I had all my drawings on film — and some day I probably will."

A seafood company only four blocks from Mr. Jorgensen's office shared neither his foresight nor his fortune. Tidewater Seafood, Incorporated, covered a full acre on the bank of the Brazos near the coast before Carla

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struck. The entire operation was ravaged and smashed for an estimated $80,000 to $100,000 loss, including one boat and $40,000 worth of supplies. And the offices . . .

There was no microfilming system. All that remains of the company's records is a crusty, battered file cabinet perched weirdly on all that remains of the office — a concrete slab.

Salt water that moves in on a city during a tropical storm is unlike ordinary fresh water when it comes to damaging paper — as the water recedes, it leaves a gummy residue on papers, tending to break down the fibers more quickly, and making them more difficult to dry.

One insurance agency in Galveston, which experienced four feet of water in its offices, scraped out the mud and debris as soon as residents were allowed back on the streets and started rapid claim work. The agency, Fletcher Harris & Son, accomplished two arduous tasks at one time when it started operations with wet documents. Using a Thermo-Fax copying machine, it reproduced duplicates of daily claims and, at the same time, dried them in the machine. Said Fletcher Harris, Jr.:

"The water rose right up to the bottom of the table where the copying machine was located. If it had been reached by the floodwaters — well frankly, I don't know what we would have done. We've had this equipment about two years, and we usually keep it in the back on the lower table."

Civil Defense estimated the number of evacuees who fled before Carla's destruction at more than 500,000. Official figures on property damage may not be available for months. The number of businesses which have been seriously impaired — some perhaps permanently — because their records were not preserved on microfilm and could not be moved quickly and easily to a high, dry place may be known only to the receding waters of hurricane Carla. □

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electronic flash

harry parker

Xenon-Filled Lamps

Xenon-filled lamps were first widely used for photography in the form of electronic flash tubes. In this particular case, the efficiency of converting electrical energy into luminous energy was achieved by discharging a condenser through the flash tube, which caused high peak currents. The result was a brilliant high peak light output that had a color balance similar to daylight. It was found that the following basic factors made this type of light source desirable for many applications: 1. Cool. 2. Clean. 3. Constant light output. 4. Daylight color balance. 5. Long life. 6. Low power requirements. Tests have proven these points to be correct.

These qualities make for many points of economy other than possible reduction of exposure time. Coolness minimizes cost of air-conditioning; low power requirements minimize cost of electrical installation and cost of operation; long life minimizes replacement of operating parts; cleanliness makes for better operating conditions; constant light output helps minimize needs for remakes.

At the present time, there are essentially four types of xenon-filled lamps that are being used and applied in the graphic arts field. They are as follows:

● **Single Flash Type.** This type is essentially the same as electronic flash equipment for photography. The factors to be determined in the application of this type of equipment are the amount of light per flash, the speed with which succeeding flashes can be made and the number of flashes required to give proper exposure. As a general rule, unless the equipment is especially designed for fast recharge, heavy duty operation, the time in between flashes makes the total overall time for exposing excessively long. Tests have shown, however, that the quality of separation negatives is the best with this type of technique. Equipment is available with varying amounts of power per flash and with varying recharge times. It is also possible to have the light output per flash adjustable, so that in some applications a single flash is all that is required for the exposure.

● **Pulsed Xenon Type.** This technique of pulsing a lamp 120 flashes per sec. or once every half cycle is a development of the above technique of single-flash electronic flash. This provides an effectively constant burning light, so that visual focusing and composing can be done with the same light source. The pulsing also achieves high gas efficiency, which results in a higher amount of light per watt. In the tests made to determine the quality of separation negatives, this type source proves superior to a constant burning source. At the present time, equipment for operating the pulsed xenon arc lamps is available in a wide range of types, sizes and power.

● **High Pressure Constant Burning Xenon Type.** One development in the efforts to adapt xenon filled lamps to the graphic arts field resulted in the development of high pressure xenon lamps. In this case, reasonable gas efficiency is achieved by operating the xenon gas at high pressures. Tubes of this type normally require air-cooling up to about 3,000 watts, and larger tubes require water cooling, with the resultant plumbing that is necessitated. Although these lamps are efficient, the hazards involved in handling these high-pressure lamps are such that manufacturers in the U.S. have refrained from making them.

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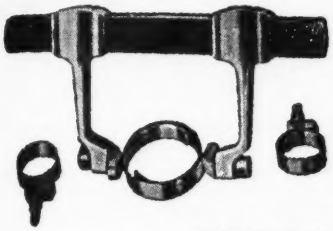

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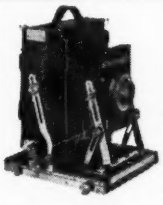

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● **Low-Pressure Constant Burning Lamps.** This low-pressure constant burning xenon filled lamp is supposed to overcome the objections to high pressure. Unless it is operated at high current densities, however, with the resultant high power, it is doubted whether or not gas efficiency will be realized.

From the above it should be understood that tests made with any of these types should be classified according to the type of xenon-filled lamp. The quality of the results and the comparison data within a particular category should be essentially the same, with equipment of the same type. It will be found that there will be differences in results with the different types of techniques. The color temperature of all xenon-filled lamps is essentially that of daylight, approximately 5,400° Kelvin. □

movie clinic

continued from page 12

ploying an optical printer and utilizing film mattes which will cover and uncover the titles.

2. It can be done in the camera by using a box about three by six feet and approximately eight inches deep. Half fill the box with sand and tilt it so that the sand will be even with the top of the box. Line up the camera so that the sides of the box do not show. Write the titles on sand. Fade in, run the required footage, flood with water and fade out while the box is flooded. Wind back and repeat with the next title. The fade-out and fade-in superimposed will create a dissolve.

3. If your camera is not equipped with a dissolving shutter the titles may be shot straight and the dissolves may later be created by A and B roll printing. □

Need movie-making advice? All questions will be answered and those of wide interest reprinted in IP. *Address your questions to: Walter Strenge, A.S.C., P.O. Box 985, Hollywood 28, California.*

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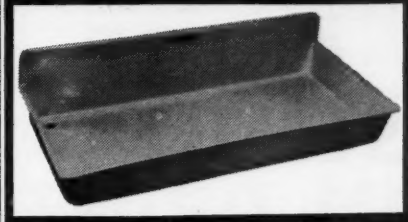

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continued from page 16

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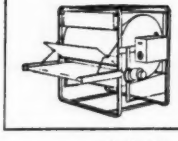

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ADVERTISERS' INDEX

Industrial Photography • *December, 1961*

ACS Tapes, Inc. 73
American Magnetic Film Striping Corp. ... 80
American Speedlight Corp. 83
Ampto, Inr. 55
Ansco ..... Cover III
Ansco-Grant ..... 15 & 64
Apache Photo Co. 91
Aristo Grid Lamp Products 72
Arriflex Corp. of America 13

Bach-Auricon, Inc. 87
Baumann Photo Chemical Corp. 74
Bebell & Bebell Color Labs 76
Bernalen Machine Specialties Co. 91
Beseler Co., Charles ..... 1 & 57
Birns & Sawyer 76
Brown & Bros., Arthur 80
Bulkley Dunton & Co. 84
Burke & James, Inc. 70
Byron Laboratory, Inc. 12

Calumet Manufacturing Co. 22
Colburn Laboratories, Inc., Geo. W. 65
Colind Photography 91
Consolidated Electrodynamics Corp. 88
Cooper-Trent Blueprint Corp. 89
Cormac Chemical Corp. 93
Customcraft Color Service 92

Deardorff and Sons Inc., L. F. 91
De Groff Laboratories, Inc. 90
DuPont deNemours & Co., Inc. ..... 4 & 5

Eastman Kodak Company ..... 7, 4th Cover
Edmund Scientific Co. 90
Edwal Scientific Products Corp. 91
Elkay Photo Products 70
Elliott Company, B. K. 89
Emde Products 87

Fairchild Camera & Instr. Corp. 71
Filmline Corporation 79
Florman & Babb, Inc. 80
F. R. Corporation 69

General Microfilm Co. 89
Goerz American Optical Company, C. P. .. 81
Graflex, Inc. 14
Graphic Systems 80

Heiland Photo Products 63
Hershey Div. Simpson Electric Co. 69
Houston Fearless Corp. 26

Ideax Corporation 3
Industrial Timer Corp. 8

Jeanneret, Inc., Roland 75
Johnke Manufacturing Co. 92

Kilborn Photo Paper Co. 82
Kimac Company 92
Kling Photo Corp. ..... 16, 59 & 85

Leedal, Inc. 2
Lektra Laboratories, Inc. 85
Lynn, Robert M. 91

Microfilm Corporation 89
Micro Record Corp. 91
Midwest Aerial Photo Survey 75
Milsco Mfg. Co. 20
Minnesota Mining & Mfg. Co. 51
Minolta Camera Co. 53
Movielab Film Labs. 94
MP-TV Service, Inc. 91

National Photo Labs. 90
Natural Lighting Corp. 86
Nikon, Inc. 11
Nu-Arc Company 67

Paillard, Inc. ..... 18 & 19
Paterson Parchment Paper Co. 83
Plymouth Products Co., Inc. 73
Polaroid Corporation, The 9
Polacoat Incorporated 82

Remington Rand 17
Reproduction Engrg. Corp. 67
Royal Zenith Corp. 24

Saunders Co. 72
Scheibe Engrg., Inc. 74
Simmon Omega, Inc. 21
S.O.S. Cinema Supply Corp. 84
Stillman Equipment Corp. 91
Sylvania Electric Products, Inc. .... 6, 33 to 36

Upson Chemical Corp. 86

Waltz, The Camera Man, Inc. 90
Webster Bros. Lab. 90

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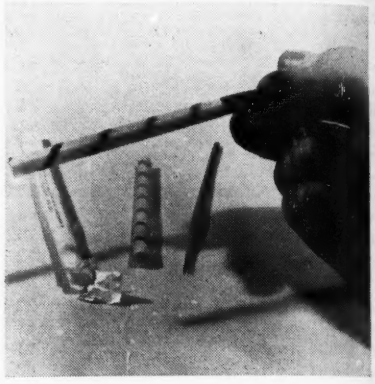

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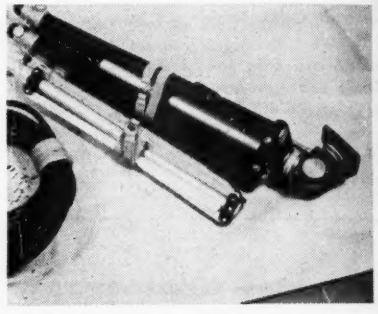
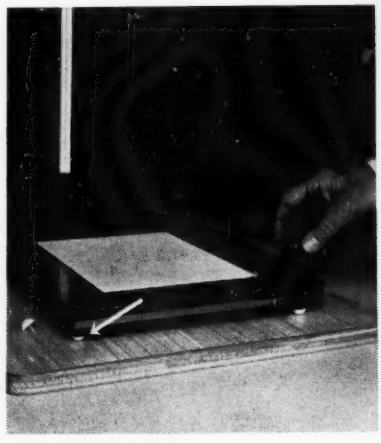


KEEP EASEL FROM SLIPPING

When making a number of enlargements from the same negative, your enlarger easel can be prevented from skidding around from a fixed position on the enlarger base by placing a small tack-type, rubber-headed bumper at each corner of the easel. These bumpers may be purchased in assorted sizes at most hardware stores. They will raise the easel slightly to allow it to be picked up more easily. — *O. A. Nelson, Seattle, Wash.*



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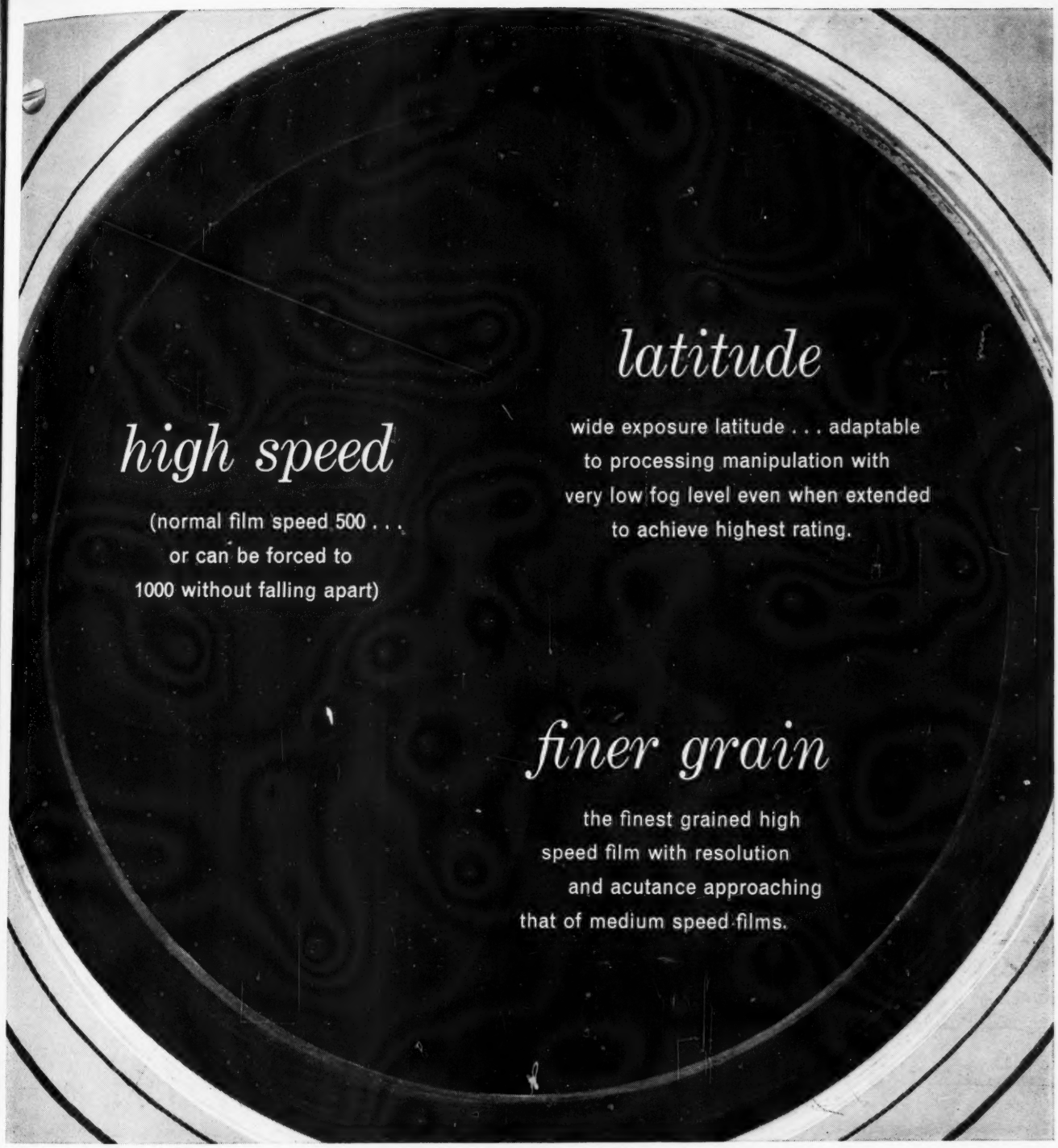
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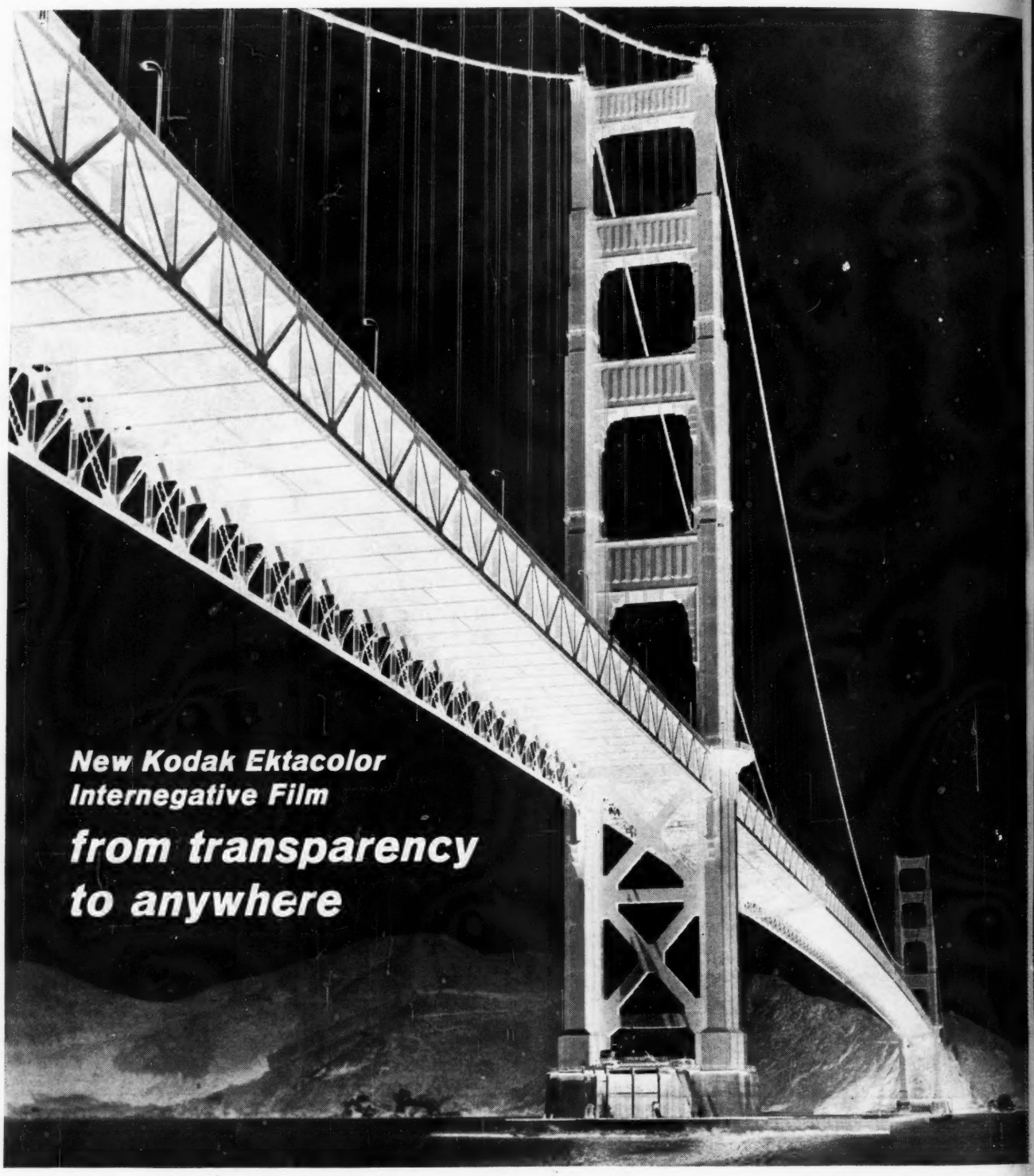

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